

# COMPLICATIONS OF ELECTIVE ABDOMINAL AORTIC ANEURYSM SURGERY

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**Abstract-** Because of significant reduction of rupture rate and increase in the patient's life expectancy, elective surgical treatment in patients with abdominal aortic aneurysm has been widely accepted. The present article aims at assessing the postoperative complications and mortality rate in patients who had been submitted to elective surgery for abdominal aortic aneurysms. This is a retrospective study, carried out on 126 consecutive patients who were operated on within a 10 years period, from 1993 to 2002. Variables included demographic data, clinical features, operation notes and postoperative outcome which were analyzed according to standard health system research. During 30 days after surgery, mortality rate was 8.4%. Mortality rate in patients older than 75 years of age was 12.5%. There was no specific correlation between associated disease and risk factors with mortality. Surgical complications were observed in 35 (29.6%) patients: 19 cases (15.2%) showed only one complication, 8 cases (6.7%) had two complications and another 8 (6.7%) had more than two complications. The most common complication was bronchopneumonia, which occurred in 10 (8.4%) patients. Results of this study suggest that there is a significant correlation between elective surgery and decreased complications of abdominal aortic aneurysm, offering a low rate of mortality and complication and a long life expectancy for the patients.

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**Key words:** Abdominal aortic aneurysms, elective surgery, complications

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## INTRODUCTION

Abdominal aortic aneurysms have become increasingly important with a prevalence rate around 2% in elder male patients (1). The prevalence rate has increased in the last few years with increasing life expectancy. Virtually all aneurysms of abdominal aorta are atherosclerotic in origin and arise below the take off of renal arteries (2). Most patients are symptom free, but aneurysm may be felt

as throbbing mass in the mid abdomen (3). Intermittent claudication can occur due to peripheral vascular involvement.

The main concern in patients with aortic aneurysms is related to their rupture, which causes abdominal hemorrhage and requires prompt surgical correction (4). Since emergency surgery has a high mortality rate, complications can be avoided and mortality can be reduced if surgery is performed in an elective fashion before aneurysm ruptures. The surgical treatment is widely accepted for patients of a higher risk of aneurysm. These are those whose aneurysm is larger than 5 cm in diameter (5).

Screening for abdominal aortic aneurysms in high risk elderly population and elective surgical intervention for the vulnerable cases may prevent

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rupture and sudden death (6). In most specialized services, due to significant reduction of rupture rate and increasing life expectancy, elective surgical treatment in abdominal aortic aneurysms has been widely accepted.

To determine the presenting features and surgical outcome of abdominal aortic aneurysms we studied cases of abdominal aortic aneurysms that were operated upon in the Vascular Surgery Department at Poorsina Teaching Hospital, Guilan Medical University of Iran.

## MATERIALS AND METHODS

All medical records of patients submitted to elective surgery of abdominal aortic aneurysm from 1993 to 2002 were analyzed. A total of 126 cases were included in the analysis for this retrospective study of mortality. The recommendation for surgical treatment was based upon the risks each patient presented. The surgery was indicated for patients with moderate and high surgical risk whose aneurysms had 6 cm in anteroposterior diameter or whose size increased by 0.5 cm within one year.

Acute myocardial infarction in less than 3 months and decompensated cardiac failure and dyspnea at rest, permanent neurological deficit, associated kidney disease or other diseases that suggest a life expectancy lower than two years were the criteria for exclusion. According to routine procedures, the assessment of risk factors and early morbidity and mortality (30 days after surgery or during the same hospital admission) was made.

Demographic data, clinical features, operation notes and postoperative outcome were extracted from patient's case records.

Data were revised and statistically analyzed according to standard health system research and using SPSS-9. Comparative analysis was done through Student test and the Chi square test.

## RESULTS

Out of 126 patients, 107 (85.8%) were male. The mean age was  $67 \pm 7.6$  (45-86) years. Average age of 19 (14.2%) females was  $68 \pm 2.1$  year.

During 30 days after surgery, mortality rate was 8.4% (Table 1). Up to the age of 75, there was no significant correlation between surgical mortality and age and gender. Patients older than 75 years showed a significantly higher mortality rate: one case (14.28%) of a total of 7 patients versus nine (8.2%) among 119 patients of age below 75 years ( $P = 0.014$ ). There was no statistically significant increase in the mortality of patients with renal insufficiency, smoking habit, chronic obstructive pulmonary disease, systemic hypertension, stroke, diabetes mellitus, and myocardial infarction (Table 2).

Surgical complications were observed in 35 (29.6%) patients (Table 1): 19 cases (15.2%) showed only one complication, 8 cases (6.7%) had two complications and 8 (6.7%) cases were complicated with more than two. Bronchopneumonia occurred with higher frequency, affecting 8.4% of (6.7%) the patients. Out of 126 patients submitted to surgery, 3(3.7%) had to be re-operated, one because of bleeding, one due to thrombosis of a prosthetic vessel, and one case because of intestinal obstruction and evisceration, respectively.

**Table 1.** Causes of early mortality and other complications 126 patients\*

	Number	Percentage
<b>Cause of mortality</b>		
Pulmonary embolism	1	0.84%
Multiple organ failure	1	0.84%
Myocardial infarction	4	3.36%
Stroke	2	1.68%
Renal insufficiency	1	0.84%
Bronchopneumonia	1	0.84%
Total	10	8.4%
<b>Complications</b>		
Bronchopneumonia	10	8.4%
Renal insufficiency	6	5.04%
Atelectasis	1	0.84%
Sigmoid Necrosis	1	0.84%
Necrosis of LL	1	0.84%
Hemorrhage at site	2	1.68%
Acute cholecystitis	1	0.84%
Wound infection	4	3.36%

\*30 days after surgery or during the same hospital admission.  
Abbreviation: LL, lower limb.

**Table 2.** Risk factors related to Post operative mortality rate in abdominal aortic aneurysm

Associated factors	Factors presence	Death	Survival	Total	P*
Smoking habit	Yes	7 (8.6%)	82	92	NS
	No	3 (2.8%)	33	36	NS
Systemic hypertension	Yes	8 (11%)	80	88	NS
	No	2 (2.1%)	36	38	NS
Stroke	Yes	0 (0%)	3	3	NS
	No	10 (8.4%)	113	123	NS
Diabetes	Yes	1 (2.8%)	35	36	NS
	No	9 (10%)	81	90	NS
Myocardial Infarction	Yes	6 (5.04%)	16	22	NS
	No	4 (4.5%)	100	104	NS

\* Chi-square test

## DISCUSSION

In patients with abdominal aortic aneurysm, the rupture may have been the first sign and emergency surgery is the only option. However, in a significant number of patients aneurysm may have been diagnosed before rupture. Two important aspects in management of these patients should be taken into account. First, most of these patients die from different diseases before ruptured aneurysm will happen although a significant number of patients die from rupture, and second, the benefits of a successful surgical treatment are depend on patients' associated co morbidities. Since mortality rates of elective surgery is less than emergency surgery (7), it is important to identify the patients who are at a greater risk of aneurysm rupture and at a lower risk of surgical death so that the surgical treatment can bring real benefits, such as improved life expectancy.

It has been confirmed that patients with aneurysms larger than 6 cm in diameter, symptomatic aneurysms, or aneurysms with an increase in diameter greater than 0.5 cm in six months are at greater risk of rupture (8-10). In these patients the current recommendations for surgery are based on surgical mortality. The mortality rate varies from a surgeon to surgeon and service to service basis. An important factor to the reduction of surgical mortality is the number of surgeries performed by a surgeon during one year. There is a relative relationship between the reduction of mortality rate and the period of time at which the surgeries are performed. The low mortality rate

results from the surgeon's experience and from the improvement of intra operative and postoperative care. Our study results are similar to that in several excellent quality services found around the world in the 1990s (11-13).

There are various complications and causes of deaths among patients with abdominal aortic aneurysm. Respiratory diseases are the most common complications, and they are caused by pulmonary embolism, hyper hydration during blood volume restoration, postoperative hypoventilation, history of smoking, and chronic obstructive pulmonary disease. The adequate use of subcutaneous heparin at low doses, respiratory and motor physical therapy, and analgesia should be used to minimize the risk factors for pulmonary disease in the postoperative period.

Cardiac disease is quite common in the postoperative period. Some authors state that 40% of patients suffer from coronary disease and that 10% of them should receive previous treatment before aortic aneurysm surgery. The mortality of patients with severe coronary disease is three times higher compared to patients without such condition. Cardiologic and hemodynamic assessment of patients before they are submitted to abdominal aortic aneurysm surgery is of paramount importance and can reduce the incidence of complications. Angina pectoris increase the incidence of arrhythmia. Therefore, patients must be monitored and receive proper cardiologic care in the peri-operative period.

The gastrointestinal complications in the postoperative period of AAA surgeries are mainly

due to the interruption of intestinal vascularization. This complication can be avoided by revascularizing the left colon through the re-implantation of the inferior mesenteric artery when it is tortuous and dilated. It is also important to keep the patency of at least one hypogastric artery. Ernst *et al.* performed routine colonoscopy and diagnosed colonic ischemia in approximately 5% of surgically treated patients (14). Our patients were not submitted to routine colonoscopy.

As to neurological complication, one death occurred due to stroke. Stroke in the postoperative period of AAA surgeries occasionally occur in patients with remarkable stenosis of the carotid arteries and with reduced blood flow caused by the surgical procedure.

Renal complications are of extreme importance, since they increase mortality in aneurysm surgeries. Patients with a high creatinine level in the pre-operative period or those who require intraoperative suprarenal aortic clamping, are at a greater risk for renal insufficiency in the postoperative period (15). The ligation of the left renal vein may be absolutely necessary in some cases and may determine a certain level of temporary loss of renal function. Six (4.7%) patients had acute renal insufficiency in our series, one of them died due to renal insufficiency and multiple organ failure. Two ureteral lesions were observed in patients with inflammatory aneurysms. The first one was immediately identified and treated by direct suture, with a good outcome. The second one was diagnosed on the sixth day after the surgery and was attributed to late ischemia from electrocautery burn. The patient needed a nephrectomy, but recovered well. Other published series show a mortality rate between 7% and 10% (16-18).

We concluded that abdominal aortic aneurysm is a disease requiring proper treatment and accurate and careful surgical procedures. The good results depend on the commitment of surgeons, anesthesiologists, and intensive care professionals towards the patients' well-being.

### Conflict of interests

The authors declare that they have no competing interests.

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