

# A 4-year prospective audit of the cause of death after infrarenal aortic aneurysm surgery

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This study was a 4-year prospective audit of abdominal aortic aneurysm surgery including 222 aneurysm repairs: 106 elective, 76 urgent and 40 emergency. Twenty-five patients died: four who underwent elective surgery, seven urgent and 14 emergency. The two major causes of death, multiple organ failure and colonic ischaemia, were responsible for 11 of the 25 deaths. The three deaths from

myocardial infarction all occurred in patients with a leaking aneurysm. Blood loss was significantly higher in patients with multiple organ failure and in those with colonic ischaemia. Methods to identify patients at high risk of massive blood loss and colonic ischaemia may be a way to reduce mortality.

Over the past 30 years the mortality rate from elective repair of abdominal aortic aneurysms (AAAs) has declined from over 15 per cent<sup>1</sup> to less than 5 per cent<sup>2</sup>. Some authors have suggested that elective mortality rates greater than 5 per cent are 'unacceptable and any surgical unit which consistently fails to achieve this figure should not continue to perform this kind of surgery'<sup>3</sup>. In contrast, reported mortality rates for repair of ruptured AAAs have not declined significantly and a recent audit<sup>4</sup> suggests that there is a wide variation in the mortality rate, from 47 to 70 per cent. The mortality rate from rupture, including deaths in the community, was found to be as high as 94 per cent<sup>5</sup>.

This study describes the results of a prospective computerized audit of 222 AAA repairs undertaken over a 4-year period. The main causes of death were analysed to look for ways in which the outcome may be improved.

## Patients and methods

All patients who had AAA repair between September 1991 and July 1995 under a single vascular consultant (P.R.T.) were entered into a prospective computerized audit. The details recorded are shown in Table 1. These were entered on to a custom-designed vascular database developed from Superbase IV (Software Publishing, Bracknell, UK), a Windows-based PC database program. Demographic details were entered on the patient's admission to hospital, and details of the medical history were taken from the patient's notes at the time of surgery. Operation details were recorded immediately after surgery and subsequent progress was entered at the time of discharge from hospital and at a routine 6-week outpatient review. During this interval the consultant provided an *ad hoc* one in one vascular emergency cover to two hospitals as well as performing all elective vascular surgery at both hospitals. Thus almost all the patients admitted to either of the two hospitals for aneurysm surgery are included.

All patients who presented electively with asymptomatic AAAs with a diameter of 5.5 cm or greater were considered for repair unless they had widespread malignancy or were receiving oxygen therapy at home. Aneurysms measuring between 4.0 and 5.5 cm were entered into the small aneurysm study. No upper age limit was applied for elective surgery; instead an attempt was made to assess physiological rather than chronological age. Patients with

Table 1 Details recorded in the computer database

Patient demographic details
Risk factors for atherosclerosis: smoking, hypertension, diabetes, hyperlipidaemia, gout, renal failure
No. of drugs taken
Symptoms and signs of arterial occlusive disease
Cardiac symptoms
Cerebrovascular symptoms
Intervention details: urgency
Operation
Name of surgeon
Grade of surgeon
Heparin dose
Operating time
Blood loss
Graft details
Inflow vessel
Outflow vessel
Complications
Comments
Outcome

symptomatic aneurysms (tenderness, back pain or embolic complications) were offered urgent surgery. Those who reached hospital with a ruptured aneurysm had emergency surgery unless they were over 80 years of age with a blood pressure of less than 80 mmHg, despite initial fluid resuscitation.

Some 190 patients were men and 32 women. The median age was 71 (range 49-89) years. None of the elective, 11 of the urgent and six of the emergency cases were tertiary referrals. In the study interval three patients were refused elective surgery on the basis of advanced cardiac, respiratory or renal disease not amenable to improvement by intervention.

The principal operator was the consultant in 35 per cent of cases, the senior registrar in 54 per cent and the registrar in 11 per cent, the latter two under supervision.

## Results

A total of 222 aneurysm repairs were performed; 106 (48 per cent) were elective, 76 (34 per cent) were urgent and 40 (18 per cent) were emergency repairs for ruptured aneurysms. The commonest risk factor was smoking (68 per cent), followed by hypertension (35 per cent), renal failure (7 per cent) and diabetes (6 per cent). All patients received prophylactic antibiotics. A tube graft was used in





