

# Abdominal aortic aneurysm

## – A plea for early elective excision (Aneurysmectomy)

Leong Yew, Pung, MBBS, FRCS

*Associate Professor & Consultant Surgeon*

*Department of Surgery, Universiti Kebangsaan Malaysia, 50300 Kuala Lumpur*

### Summary

Though peripheral arterial disease is not as common as in the Western countries, abdominal aortic aneurysm (AAA) is the most frequent arterial problem in Malaysia. A prospective study was made of 100 consecutive patients who presented with AAA to the author between January 1986 to September 1988 (31 months' period). There were 88 males and 12 females. The age range was 47–90 years, mean = 68.7. All the major ethnic rates were equally affected. The sizes of the AAA were documented by ultrasonography and the diameters ranged from 3–10 centimetres, mean = 5.8. Aneurysmectomy was performed on 58 patients, 17 of which were emergencies for ruptured AAA. The operative mortality for elective surgery was 2 percent, but that for emergency surgery was 47 percent. Ten patients refused surgery and 28 were not offered an operation.

The true incidence of AAA is likely to be much higher than the number of patients referred for treatment. Many cases are not diagnosed or referred for treatment. Many cases of ruptured AAA died at home or in peripheral hospitals without a diagnosis being made. It is estimated that an AAA is present in 17,000 persons in Peninsular Malaysia. The risk of elective surgery is significantly lower than that of emergency. The overall mortality for ruptured AAA is even higher at about 99 percent. Furthermore, AAA is a benign disease and after surgery the patients return to their normal life expectancy. It is recommended that patients with AAA of five centimetres or more should be advised surgery if premature death is to be avoided.

*Key words:* Abdominal aortic aneurysm, aneurysmectomy, Malaysia.

### Introduction

The first successful resection of an abdominal aortic aneurysm (AAA) was reported in 1952.<sup>1</sup> Since then, the surgical technique has been refined and newer and better instruments, prosthetic vascular grafts and suture material has become available. The anaesthetic management and the perioperative care has also improved.<sup>2</sup> Hence, it is not unexpected that the results of this procedure have steadily improved. The operative mortality for elective operation is now less than 5 percent in most centres which perform the operation regularly.<sup>3,4,5</sup> With this acceptable result and a very high mortality for ruptured AAA, most centres now take an aggressive approach in the management of this disease. In this country, peripheral arterial diseases is not as common as in the West.<sup>6</sup> AAA is the most frequent problem seen at the Vascular Surgery Service (VSS) at Universiti Kebangsaan Malaysia. However, the diagnosis is still frequently missed; and in other instances where the diagnosis is made, the patient is frequently not referred for treatment.

The aim of this study was to review the clinical presentation, diagnosis and management of patients with this disease. The outcome of these patients and the results of treatment will also be reviewed. It is hoped that this study will increase the awareness of this disease and its treatment.

## **Patients and Method**

This was a prospective study of 100 consecutive patients with AAA under the care of the author. An AAA was defined as a localised dilatation of the abdominal aorta of three centimetres or more. In all cases, the diagnosis was confirmed by ultrasonography or at operation (in the case of ruptured AAA). The study period was 48 months, from January 1986 to December 1989. All the patients were first seen in the initial 31 months' period. Therefore, the follow-up period was between 15 to 48 months.

Elective referrals were first seen at the Vascular Clinic where a preliminary assessment was made. Urgent and emergency cases were admitted directly to the ward. Patients details and assessment were recorded. All patients except those with a ruptured AAA had an abdominal ultrasonograph to document the size of the aneurysm. If suprarenal involvement was suspected a computerised tomogram and/or an aortogram might be performed.

Patients who were considered candidates for an operation would undergo a more thorough pre-operative workup. This would include a electrocardiograph, chest radiography, full blood picture, renal profile and serum lipid. In the second half of the study, these patients also had a cardiac assessment by a single cardiologist. Other investigations were performed if it was felt necessary. Patients who needed treatment for a medical condition like cardiac failure or peptic ulceration would have their operation deferred till they were considered fit. However, if the patient had an expanding or a large AAA he might be operated upon urgently.

Post-operative patients were nursed in the general ward. If an intensive care bed was available, a high risk patient would be admitted to the Intensive Care Unit for overnight observation. Operative morbidity and mortality were recorded. Upon discharge, all patients were followed up at the Vascular Clinic. Patients who were not offered or who refused an operation were reviewed regularly at the Vascular Clinic with ultrasonography to monitor the progress in size of the AAA. Operation might be advised at a later date.

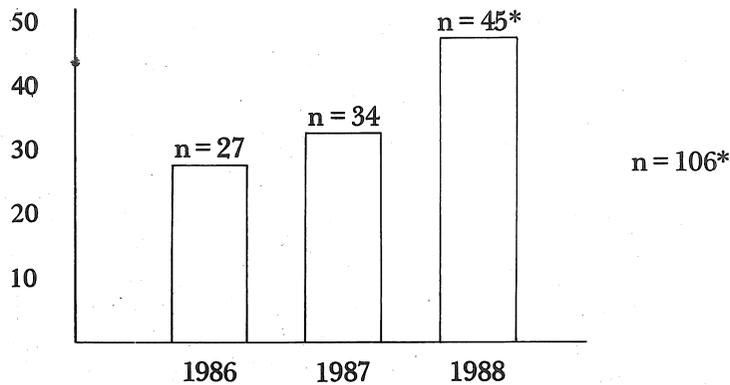
It is the policy of the author to advise operation to all patients who had an AAA of five centimetres or more in the maximum diameter. If the aneurysm was smaller but symptomatic (apin), the operation might be offered earlier. Exceptions to this general rule would be discussed. All patients with a ruptured AAA were operated upon.

## **Results**

During the 31 month (Jan 1986 – Sep 1988) period, 100 new cases of AAA were seen. The number of cases seen had increased gradually over the period (see Fig 1). The sex ratio was 88 males to 12 females. The racial distribution was 52 Malays: 35 Chinese: 7 Indians: 6 others. The age range of the patients was 47–90 years, mean = 68.7.

**Associated illness:** Most patients were elderly and had other illness besides the AAA. Illness related to atherosclerosis were the most common. Forty percent of the patients were hypertensive

**Figure 1**  
Cases seen according to year



\* Six cases were seen outside the study period

requiring medication and 28 percent had a previous acute myocardial infarction or had symptomatic ischemic heart disease. In 10 percent there was associated peptic ulcer disease. Other associated illness are listed in Table 1. Eighty-six percent of the patients were chronic smokers.

**Presentation:** In 41 cases, the AAA was asymptomatic. The diagnosis was made by the attending doctor when the patient presented with symptoms or illness unrelated to the AAA. In 20 patients, a pulsatile mass was noted by the patient. Twenty-two patients presented with abdominal pain linked to the AAA. Seventeen patients presented in a collapse state when their aneurysms ruptured.

**The aneurysm:** In 97 cases, the AAA were infrarenal. Two patients had suprarenal aneurysms and the other had a thoracoabdominal aneurysm. The cause of all the AAA may be attributed to atherosclerosis except for one patient with end-stage renal disease who presented with a ruptured mycotic AAA. In 36 cases there were associated iliac aneurysms or involvement of the iliac arteries by the AAA. Two patients also had popliteal aneurysms and three had femoral

**Table 1**  
Associated illness

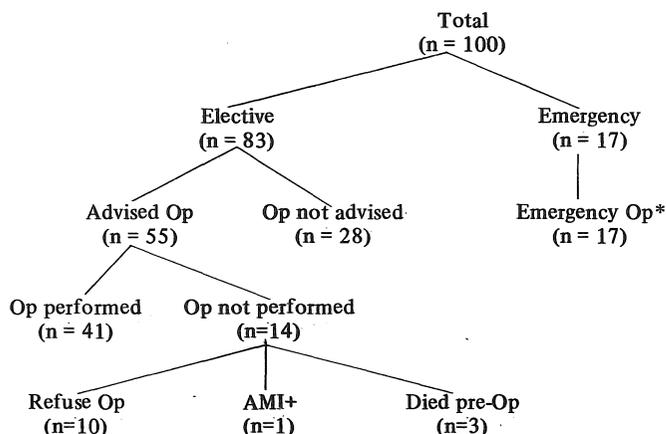
Smoking	86
Hypertension	40
Ischemic heart disease	18
Previous myocardial infarction	10
Chronic airway disease	12
Peptic ulceration	10
Chronic renal failure	4
Diabetes mellitus	2

aneurysms. The maximum diameter of the AAA (by ultrasonography) ranged from 3.0 to 10 centimetres, mean = 5.8.

**Management:** Seventeen patients presented as emergency with ruptured AAA. All these patients had laparotomies for excision and grafting of the AAA. Of the 83 patients who presented electively, 55 of them were advised to have operations. However, only 41 patients underwent laparotomies for excision and grafting of the AAA. Three patients who agreed to surgery died while waiting for their operations; two of them from rupture of the AAA and one from a massive cerebrovascular accident. One patient had his operation postponed because he had a myocardial infarction the evening before his scheduled operation. Ten patients refused surgery despite adequate explanations (see Figure 2).

Twenty-eight patients were not offered surgery. The reasons for this are listed in Table 2. Small aneurysms were defined as asymptomatic AAA whose maximum diameter was less than 4.5 centimetres. These patients (n=13) would be followed-up regularly and operation would be advised if the aneurysm size had increased to over 5 centimetres. One 70 year old patient

**Figure 2**  
Management of 100 patients with abdominal aortic aneurysm



\* Operation

+ Myocardial infarction one day before schedule operation

**Table 2**  
Reasons for non-operative treatment

Small AAA	13
Recent myocardial infarction	2
Advanced carcinoma	3
Terminal illness	3
Old, senile and poor health	6
Suprarenal AAA in an elderly	1

with a suprarenal aneurysm was considered unfit to withstand thoracotomy. Two patients had asymptomatic AAA diagnosed when they were admitted to the Coronary Care Unit for an acute myocardial infraction. These patients would be advised operation after recovery. Six elderly patients (all over 80 years old) were not offered an operation because they were also senile. Three patients with advanced carcinoma and three patients with terminal non-malignant illness were also not offered surgery.

**The operation:** A total of 58 operations were performed. The standard excision and in-lay grafting were performed through a midline or tranverse incision. A left thoracoabdominal incision was used for excision of the thoracoabdominal aneurysm. Where possible, a straight tube graft was laid in. This was achieved in 37 cases. In 19 patients, bifurcated grafts were used because the bifurcation of the aorta was involved by the AAA or there were large iliac aneurysms. Darcon graft was the graft of choice. The operation time varied from 1.5 to 6.0 hours, mean = 3.0. Blood transfusion varied from nil to six units for elective operations, mean = 2.3. The blood transfusion required for ruptured AAA was significantly higher and varied from five to 20 units, mean = 10. The hospital stay varied from five to 30 days for elective surgery, mean = 11; and 10 to 33 days for emergency, mean = 17.5. Most patients could be discharged one week after the operation.

**Operative morbidity and mortality:** The operative morbidity is listed in Table 3. All these patients recovered with conservative treatment except for one of the patients with small bowel obstruction who required a laparotomy. The incidence of subclinical myocardial infarction is not listed here, but in a separate study of 53 patients a significant incidence was noted.<sup>7</sup> The operative mortality for ruptured AAA was eight out of 17 cases (47%). There was one single death in the 41 elective cases, giving an operative mortality of 2 percent: This patient died from uncontrolled hemorrhage from generalised oozing from the peritoneum and the retroperitoneal space, probably from a form of coagulopathy.

**Table 3**  
**Operative morbidity**

Chest infection	6
Cardiac failure	2
Cardiac arrhythmias	1
Pulmonary embolism	1
Cerebro-vascular accident	1
Wound infection	3
Small bowel obstruction	1

## Discussion

AAA is the most common arterial disease seen at the VSS of UKM. Yet, only 100 cases were seen in a 31 month period. Considering that this is the main referral centre in the country, the number of cases seen was low compared to centres in Western countries where more than 100 cases would be seen each year. This was the referral pattern and need not represent the true incidence of the disease. AAA that were not diagnosed (either because the patient did not present or because the diagnosis was not made by the medical practitioner), AAA which were diagnosed

but not referred for treatment, and cases of ruptured AAA that died at home or in hospital (other than those in the VSS), were not included.

It is likely that the true incidence of AAA is much higher than was presented here. It has been estimated that AAA is present in one to 4 percent of the population over the age of 50.<sup>8,9</sup> In Peninsular Malaysia 1.7 million of the population is over the age of 50.<sup>10</sup> Taking a conservative estimate of 1 percent, AAA is present in 17,000 persons. Furthermore, with an increase in life expectancy, the proportion of elderly people will increase. Atherosclerosis, the pathology in nearly all cases of AAA, is already a common problem in this country. This is reflected by the high incidence of coronary artery disease and cerebrovascular disease.

The low number of cases seen may be explained. AAA is frequently asymptomatic until its rupture. Hence, many patients with AAA probably never present themselves to a doctor and are never diagnosed. Furthermore, unless the medical practitioner is aware of the condition and looks for it in the abdominal examination, an AAA can be missed.<sup>11</sup> Even when the diagnosis is made, there is still reluctance among some medical practitioners to refer their patients for treatment. Instead, the patients are told that nothing could be done or they are too old for an operation. Eight of our patients who were denied treatment one to 10 years previously had a successful operation during the study period. Similar reluctance to refer patients and ignorance of the benefit of surgery has been reported elsewhere.<sup>12</sup> Education on the benefit of treatment can increase the elective referral rate.<sup>13</sup>

The number of cases of ruptured AAA seen is too small to be its true incidence. In other centres one-third to one-half of the cases would present as ruptured AAA.<sup>4,15</sup> Only a very small fraction of the total number of cases are referred and arrived at this centre. Studies in developed countries had shown that between 27 to 62 percent of patients with ruptured AAA died at home without seeing a doctor.<sup>16,17,18</sup> In 52 to 74 percent of patients, a correct pre-operative or pre-mortem diagnosis was never made.<sup>18,19</sup> In Malaysia, which has a large rural population and centres only in Kuala Lumpur, the number of undiagnosed cases that died at home or in a peripheral hospital must be much higher. With a very low autopsy rate, the true magnitude of this problem may never be realised.

The treatment for AAA is aneurysmectomy, that is surgical excision and in-lay grafting. All patients with an AAA of 5 centimetres or more in maximum diameter should be offered surgery. An AAA increases in size (diameter) at an average rate of 0.5 centimetre per year but the rate of expansion increases with its size.<sup>20</sup> The risk of rupture of an AAA correlates best with its size. The risk of rupture of a 4 centimetre AAA is 15 percent per year while that for an 8 centimetre AAA is 74 percent.<sup>21</sup> A diameter of 5 centimetres is taken as a cut-off point because after this point the risk of rupture increases rapidly. Though the risk is less, a small AAA can also rupture.<sup>22</sup>

Aneurysmectomy in an established centre is now quite safe. The operative mortality for elective operation has improved over the last three decades. In most larger centres it is now less than 5 percent.<sup>3,4,5</sup> Ours was 2 percent. The benefit of surgery is easily realised if we compared this to the operative mortality for emergency operation. It has remained unchanged at 40 to 80 percent<sup>14,16,18</sup> and it is nearly 50% at our centre. The overall mortality for this condition (including those patients who were not operated upon and those who died at home) is even higher at about 90 percent.<sup>16,18</sup> In Malaysia, this is probably about 99 percent. With such a gross difference in the mortality for elective operation and ruptured AAA, all patients should be advised surgery before the AAA ruptures.

Few patients need to be denied operative treatment. With the necessary precautions, elderly patients could be operated upon safely.<sup>23</sup> More than 50 percent of our patients who were operated upon electively were over the age of 65 and there was no mortality in this group. Provided there is no danger of impending rupture, patients with cardio-respiratory or any other illness can be treated and stabilised before their operation. If facilities are available, patients with severe ischemic heart disease may undergo coronary artery bypass grafting before or concomitant with operation for the AAA.<sup>24,25</sup> Only 28 of our patients were not offered surgical treatment. Each patient was assessed individually.

AAA is a benign but potentially lethal disease. After a successful operation, patients return to their normal activities. Their life expectancy returned to normal and equal to that of their peers.<sup>26</sup> Without treatment, sudden death from rupture of the AAA is to be expected. There is little hesitation to refer or to operate on a patient for carcinoma even though these patients prognosis is often poor. Yet many patients with an AAA had been denied treatment.

If good results are to be expected, the treatment should be confined to centres with the necessary facilities and expertise. Surgery for AAA should not be performed by the occasional operator.<sup>27,28</sup> Pre-operatively, the patient should be adequately assessed and prepared for the surgery. There should be careful intra-operative monitoring with maintenance of the blood pressure and other vital signs. Post-operatively, the patient should be closely observed, preferably in an Intensive Care Unit.<sup>29</sup>

It is concluded that the incidence of AAA in this country is not as high as the Western countries, but the true incidence is probably much higher than the number of cases referred for treatment. The treatment for AAA is aneurysmectomy and all patients with an AAA of 5 centimetres or more in diameter should be advised surgery if premature death is to be prevented. In an established centre with the necessary facilities and expertise, good results comparable to those in centres in the Western countries could be achieved. A team approach with proper pre-operative, intra-operative and post-operative care is important. There is a need for increased awareness of this disease and the benefit of its treatment.

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