

LORD BROCK

REFERENCES

- BROCK, R. C. (1952) *The Life and Work of Astley Cooper*. Edinburgh, Livingstone.  
COOPER, SIR ASTLEY (1835) *Lectures on the Principles and Practice of Surgery*, 8th edit, p. 309. London.  
EADE, SIR PETER (1886) *Some account of the Parish of St. Giles, Norwich*. London.  
Jarrold. (1900) *The Norfolk and Norwich Hospital 1770-1900*, p. 153. London,  
Jarrold.  
HEWSON, W. (1777) *Experimental Enquiries III*, p. 85. London.  
Jarrold. (1846) *Proc. Sydenham Soc.* p. 260. (*The works of William Hewson, F.R.S.*, edit. G. Gulliver. London, Sydenham Society.)  
JOHNSON, C. B. (1905) *William Bodham Donne and his Friends*, pp. 10 and 11. London,  
REISINGER, F. (1824) *Ann. Chir.* 1, 207.  
RYCROFT, SIR BENJAMIN (1965) *Ann. Roy. Coll. Surg. Engl.* 36, 152.

---

---

ABDOMINAL AORTIC ANEURYSMS

A discourse on aspects of treatment

Paper read during the Annual Meeting of the College in Norwich

on

27th September 1968

by

Roy Y. Calne, M.S., F.R.C.S.

Professor of Surgery, University of Cambridge

WITH AN AGEING population and improvements in the treatment of infectious diseases, deaths from atherosclerosis are becoming increasingly common. The usual sites of fatal atherosclerotic disease are the cerebral and coronary arteries. Although the results of surgery for occlusive disease for the extra-cranial carotid and vertebral arteries are improving, and the Vineberg operation provides relief from angina for a minority of specially selected patients, most lesions of these vessels are not particularly amenable to surgical treatment. Abdominal aneurysms, however, are eminently suitable for direct surgery. The predilection of the aorta below the renal arteries for aneurysmal disease provides the operator with surgical anatomy that he can usually manage. It is appropriate at this meeting to recall that Astley Cooper, in 1817, was fully aware of this fact, and anybody who has operated on an abdominal aneurysm will know exactly the experience to which Astley Cooper referred when he performed the first ligation of the human aorta. Via a transperitoneal approach he achieved control of the aorta above the aneurysm and, looking round to the spectators, he said, "Gentlemen, I have the pleasure of informing you that the aorta is now hooked upon my finger."

The modern era of direct aneurysm surgery began in 1951, when Dubost excised an aneurysm and replaced it with a homograft aorta. Initially the operation had an alarmingly high mortality, as with most new surgical procedures. The only cases the surgeon felt justified in operating on, or his colleagues were prepared to refer to him, were patients in a terminal moribund condition, many of whom would not have tolerated a general anaesthetic, let alone a major operation. In a few years, how-

## ABDOMINAL AORTIC ANEURYSMS

ever, the surgical technique became established. The principles of management were accepted, and by 1961 hospital mortalities of 58 per cent for ruptured aortic aneurysm, and 9.6 per cent for elective procedures, were reported from Boston (Gryska *et al.*, 1961). Similar results have been obtained from many centres, and long-term follow-up of patients surviving operation reveals a life expectancy somewhat less than the population in general, mainly due to the higher incidence of generalized atherosclerosis in aneurysm cases. Adequate assessment requires more than a consideration of the operative mortality, particularly when faced with a patient with a symptomless abdominal aneurysm. Reliable data on the natural history of aneurysms is difficult to obtain. A careful analysis of the literature by Bernstein *et al.* (1967) produced an overall five-year survival rate of 30–35 per cent for untreated abdominal aneurysms following initial diagnosis. Deaths from rupture occurred in only 36 per cent of 607 cases, the remaining deaths being unrelated to the aneurysms. Massive extra- or intra-peritoneal rupture, however, carries virtually 100 per cent mortality within hours of the ictus. Aneurysms producing symptoms of backache, radiating pain, peripheral embolization or massive increase in size also have an extremely rapid, fatal outcome in the majority of cases. Unfortunately, in the age group where aneurysms occur, co-existing disease frequently complicates the situation to an important extent. Particularly common is atherosclerosis of other parts of the arterial tree, especially the coronary and cerebral vessels. The patient may have had a stroke or a myocardial infarct, and not infrequently both. Diminished renal functional reserve may result in kidney failure after a perfectly executed operation for aneurysm.

There has been extensive debate on the management of patients with symptomless aneurysms and much of the difficulty is due to the variation in individual case histories. Probably between 60 and 70 per cent of patients with symptomless abdominal aneurysms will not die from rupture. Before this occurs other fatal diseases will have developed. It would obviously be wrong to operate on such cases, but preselection is uncertain. When then should the operation be advised? Careful observation of the patient over a period of time is a reasonable compromise with assessment of the cardio-vascular system and renal tract. If there is any evidence that the aneurysm is enlarging clinically or radiologically, or if the patient develops symptoms, then elective surgery is indicated. Unfortunately, sudden massive rupture often occurs from aneurysms that have produced no previous symptoms and many surgeons feel that removal of abdominal aortic aneurysms is justified in most cases since this increases the overall life expectancy. A critical dimension of 7 cm. maximal diameter measured clinically or radiologically is considered to be of prognostic importance (Crane, 1955). The incidence of rupture of symptomless aneurysms smaller than this is less than the risk of an elective operation (Bernstein *et al.*, 1967).

According to the statistical review of the Registrar General (1962), aortic aneurysms were responsible for the death of 3,042 people per year, 1,753 males and 1,289 females. Probably a third of these were thoracic, mainly dissecting; this would leave approximately 2,000 deaths from ruptured abdominal aortic aneurysms each year in England and Wales. Most of the deaths were between the ages of 55 and 80.

Abdominal aneurysm is therefore a common, fatal illness. For more than a decade the results of surgery after rupture have been fair and in the cases before frank rupture has occurred the results have been good. Long-term follow-up of these patients has also been gratifying, particularly since prosthetic grafts were substituted for arterial homografts. Prosthetic grafts of the aorta and its main tributaries tend to remain patent and are unlikely to develop complications, certainly for 10 years and probably for longer. Since the age group being treated is elderly this is an acceptable situation.

In preparing this address I obtained the notes of all cases of abdominal aneurysms admitted to Addenbrooke's Hospital in the decade 1957-1967. There were 47 cases, 29 males and 18 females, with an average age of 72, ranging from 50 to 93. Fourteen (30 per cent) patients died of ruptured aneurysm without any attempt at surgery. Ten patients with ruptured aneurysm were operated on and four of these (40 per cent) left hospital alive. Ten patients were operated on electively, nine with symptoms and one without symptoms. Nine of these patients left hospital alive, one died. Sixteen of 47 (33 per cent) patients were recorded in the notes as having severe disease other than aneurysm, which included disseminated cancer, cerebro-vascular disease, myocardial infarction and heart failure. If this experience, to which I refer, is typical of the fate of patients with aneurysms throughout the United Kingdom then there would appear to be a cause for concern where only 10 of 24 (42 per cent) patients with ruptured aneurysm were subjected to surgery. The surgery of abdominal aneurysm is a highly specialized operative procedure. The best results are obtained where there is a group of surgeons, anaesthetists and operating theatre staff familiar with the problem, performing a reasonable number of operations in the course of a year. In view of the large number of patients presenting to hospital with ruptured aneurysms, previously undiagnosed, it appears that there is a need for more careful scrutiny of patients' abdominal aortas in general practice and medical out-patients, and early referral of patients with aneurysms to vascular surgeons. Such patients should be followed up at the vascular surgical clinics and assessed for suitability for elective operation.

The extreme urgency in dealing with the ruptured aneurysm is becoming increasingly appreciated. Patients should be given morphia and transferred to hospital as rapidly and gently as possible. On admission the receiving doctor should take blood for cross-matching, put up an intravenous infusion and alert the theatre, surgeon and anaesthetist.

## ABDOMINAL AORTIC ANEURYSMS

These simple procedures should be accomplished within 10 minutes of seeing the patient. There is no virtue in protracted transfusion of blood if the patient is exsanguinating into his abdominal cavity. It is vital for him to be moved with the utmost speed and gentleness to the operating theatre. A skilled anaesthetist, experienced in the management of rapid blood loss, is at least as important as the surgeon's competence to perform the operation. Since most abdominal aneurysms arise below the renal vessels it is usually possible to clamp the aorta below the renal arteries and control the aneurysm, but occasionally it is necessary to clamp the aorta above these vessels. This will obviously produce renal ischaemia and is likely to result in tubular necrosis. Unfortunately, clamping the aorta just below the renal arteries is also liable to impair the blood supply to the kidneys.

There is good circumstantial evidence that intravenous mannitol protects the kidney from ischaemic damage, but it is essential that the mannitol is given before the kidneys become ischaemic. One hundred millilitres of 20 per cent mannitol should be given during the induction of anaesthesia, whilst a second intravenous infusion is being set up. Fortunately, most blood transfusion laboratories understand the urgency of a ruptured aneurysm, but there is still a tendency amongst some haematologists to insist on a perfect crossmatch before giving blood. This attitude usually results in giving accurately grouped blood to an exsanguinated corpse. If the patient's condition is desperate, it is far better to give uncrossmatched blood of compatible A B O group.

I will not presume to discuss details of surgical technique. The principles are common knowledge, but it is perhaps worth emphasizing that the initial main objective in aneurysm surgery, as in most other forms of vascular surgery, is to obtain control of the vessel proximal to the point of bleeding. Massive haemorrhage from the aorta will be lethal if more than a few seconds elapse before it is controlled, no matter how many intravenous infusions are working. Under these circumstances it may be necessary for the surgeon to control the aorta above the leak manually before attempting a formal dissection, to allow him to apply an aortic clamp. The traditional incision for aneurysm surgery has been midline or paramedian from the pubis to the xiphoid. A better view, however, of the upper end of the abdominal aorta can be obtained by a transverse incision above the umbilicus, from flank to flank. This gives excellent access to the aorta up to the diaphragm but, if the aneurysm extends into the iliac vessels, the distal anastomoses may be poorly visualized with this incision. If the lower anastomosis cannot be done *via* this incision, then the iliac vessels can be by-passed and the two limbs of the prosthesis can be threaded behind the inguinal ligaments to the femoral arteries. With all the drama and urgency in the management of a ruptured aneurysm it is well to remember that, should the prosthesis become infected, the patient will almost certainly die from secondary

haemorrhage; therefore scrupulous attention to sterile precautions is necessary at all times during the operative procedure.

It would seem that the concept of direct surgery for abdominal aneurysms enunciated and first practised by Astley Cooper has now reached potential fulfilment and the time has come for a critical look at the management of abdominal aneurysms, so that all cases receive the maximum benefit that surgery can offer.

#### REFERENCES

- BERNSTEIN, E. F., FISHER, J. C., and VARCO, R. L. (1967) *Surgery*, **61**, 82.  
BROCK, R. C. (1952) *The Life and Work of Astley Cooper*, p. 58. Edinburgh and London, Livingstone.  
CRANE, C. (1955) *New Engl. J. Med.* **253**, 954.  
DUBOST, C., ALLARY, M., and OECONOMOS, N. (1952) *Arch. Surg.* **64**, 405.  
GRYSKA, P. F., WHEELER, G. G., and LINTON, R. R. (1961) *New Engl. J. Med.* **264**, 639.

---

#### ELECTION TO THE HONORARY FELLOWSHIP

THE ROYAL COLLEGE OF SURGEONS OF ENGLAND has elected the following to the Honorary Fellowship:

Neville Blond, of East Grinstead.

Sir Macfarlane Burnet, of Melbourne, Australia.

Lord Cohen of Birkenhead.

Lieutenant-General Leonard Dudley Heaton, of the U.S. Army Medical Services.

Professor Robert Merle d'Aubigné, of Paris.

Lord Sieff of Brimpton.

Leonard John Williams, of Ealing.

Sir Isaac Wolfson, Bt., of London.

---

#### COLLEGE PUBLICATIONS

THE COUNCIL INVITES any interested Fellow who would like to make a specific gift to the College to consider the possibility of presenting a new showcase for College publications.

An appropriate case has been designed in consultation with Mr. Norman Capener, Chairman of the Publications and Public Relations Committee, and would cost £200. The case would stand in the Entrance Hall of the College and would greatly improve the appearance of the Hall as well as providing a dignified and useful display of College publications.

If a donor is found the showcase could bear a plaque recording his gift, which might, if he so wished, be made in memory of some other person.