Aortic aneurysmorraphy without blood transfusion or ileus: the exclusion operation

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The exclusion technique for abdominal aortic aneurysmorraphy combines the advantages of the extraperitoneal approach with non-resective treatment. There is therefore minimal blood loss, ileus, respiratory embarrassment, or fluid and electrolyte imbalance. Thus, blood transfusion, assisted ventilation, naso-gastric or gastrostomy intubation are only rarely needed. The technique is of great value in poor risk cases or in situations where extensive life support and monitoring systems are limited.

Repair of an abdominal aortic aneurysm remains for the general surgeon one of the most formidable operations he is called upon to perform. Blood loss, fluid and electrolyte imbalance, prolonged ileus and respiratory problems all contribute to the morbidity and mortality in these patients, who often already have widespread cardiovascular disease.

In a developing country such as ours, with limited intensive care facilities, blood bank stores and hospital beds, any technique that minimises morbidity, blood loss and the need for special facilities will be especially valuable. We have found that aneurysmorraphy by the exclusion operation via a retroperitoneal approach fulfils these criteria and is of special value in poor risk cases or in situations where extensive life support and monitoring systems are limited.

Principles and technique

The aneurysm is excluded from the circulation by oversewing the distal stump of the transected aorta at the neck of the aneurysm and ligating the proximal iliac or femoral arteries. Circulation to the lower limbs is restored by an aorto bi-iliac or femoral graft placed extraperitoneally.

The patient lies supine but the upper trunk is rotated to the right so that the shoulders lie in a vertical plane with the left shoulder pointing to the ceiling and the left hand extending over the right side of the operating table.

An oblique muscle–cutting incision is made in the left flank through the bed of the 11th rib, extending from the anterior border of sacrospinalis posteriorly, as far as and including the lateral border of the left rectus abdominis muscle, midway between the umbilicus and pubic symphysis anteriorly. The exposure and retroperitoneal dissection is facilitated by rotating the entire operating table to the right. The peritoneum and retroperitoneal fat are pushed forward keeping as close as possible to the posterior abdominal wall muscles. Thus, the left kidney, ureter and renal vessels are pushed anteriorly. Dissection along the left renal artery exposes the neck of the aneurysm. Inferiorly, in the same retroperitoneal plane the left iliac arteries are easily exposed. Dissection of the right femoral artery is facilitated by rotating the operating table to the left. A tunnel is then made from the inferomedial end of the flank incision to the right groin by blunt dissection anterior to the bladder (in the retropubic space).

The aneurysm neck is then divided between 2 straight vascular clamps. The distal end is oversewn with 3/0 polypropylene while the proximal end is used for anastomosis to the graft. The graft must be rotated 90° to the position it normally occupies in the transperitoneal approach, so that the limbs now lie in an anteroposterior plane with the right limb anterior and the left limb posterior. The left (posterior) limb is anastomosed end-to-end to the distal end of the transected left common or external iliac artery while the proximal end is transfixed and ligated. The right (anterior) limb is taken through the tunnel to the right groin where it is anastomosed end-to-end to the distal transected right femoral artery (after the proximal end has been transfixed and ligated).

Material and results

We have performed aorto-iliac aneurysmorraphy by this exclusion technique in 14 cases, (Table 1). All patients had a pre-operative haemoglobin of 12 g/dl or greater. None of the patients needed intensive care management although 5 had previous cardiac disease and 4 chronic pulmonary disease. No patient was given assisted ventilation but case 10, who had smoked for 61 years and had chronic obstructive pulmonary disease was given oxygen via a face mask for 24 hours. He was kept on verapamil for a cardiac arrhythmia that was present prior to surgery.

The average blood loss was 525 ml and one patient (Case 1) who lost most of the blood through the interstices of a knitted graft was transfused one pint of blood intra-operatively. Another patient (Case 10) had

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TABLE 1

Aorto-iliac aneurysmorraphy in 14 patients

Case	*Age*	*Sex*	*Aneurysm*	*Graft*	*Blood loss*	*Toleration of oral fluid post-op (hours)*	*Hospital stay (days)*
1	72	M	A bi-iliac*	Knitted Dacron	800 ml	30	9
2	65	M	A bi-iliac	Knitted Dacron	400 ml	36	10
3	68	M	A bi-iliac	Knitted Dacron	300 ml	48	10
4	56	M	A R iliac	Woven Dacron	350 ml	48	10
5	58	F	A bi-iliac	Woven Dacron	500 ml	48	10
6	59	M	A R iliac	Knitted Dacron	300 ml	36	10
7	80	F	A bi-iliac	Woven Dacron	600 ml	24	12
8	68	M	A L iliac	Woven Dacron	500 ml	24	8 (died)
9	74	M	A R iliac	Knitted Dacron	700 ml	36	10
10	75	M	A bi-iliac	Woven Dacron	800 ml	24	9
11	79	M	A bi-iliac	Woven Dacron	700 ml	48	9
12	65	M	A L iliac	Woven Dacron	500 ml	24	8
13	83	F	A bi-iliac	Woven Dacron	500 ml	24	9
14	73	M	A R iliac	Woven Dacron	400 ml	24	8

*A bi-iliac: aorto bi-iliac; A R iliac: aorto right iliac; A L iliac: aorto left iliac

a pre-operative haemoglobin of 12.2 g/dl, which dropped to 9.6 on the 2nd postoperative day. He was given 1 pint of blood on the 3rd postoperative day and recovered uneventfully. All patients tolerated fluids orally within 48 hours and none needed nasogastric intubation or gastrostomy for ileus or vomiting.

There was one death. Case 8, who had cardiomegaly and a supraventricular tachycardia, was controlled pre- and intra-operatively on propranolol. Blood loss was 500 ml and the haemoglobin fell from 13.6 g/dl on admission to 12.4 g/dl when he died 8 days later. His recovery had been as uneventful as all the other patients, getting out of bed and having normal meals on the 3rd postoperative day. His tachycardia was controlled on propranolol. On the 8th postoperative day he had a myocardial infarction with sudden severe chest pain and shortness of breath, and he died within 30 minutes.

Discussion

Although Dubost[1] performed the first aortic aneurysm repair in 1951 by an extraperitoneal thoraco-abdominal approach, most surgeons now use an anterior midline transperitoneal exposure for aneurysmorraphy. In 1966, Oscar Creech found that surgery was easier and safer with less blood loss if instead of resecting the aneurysmal sac, the graft is placed within it[2]. Blood loss, cardiovascular and respiratory complications were further minimised by the non-resective treatment of abdominal aortic aneurysms[3], though the weak point of

this operation is the use of the extra-anatomical axillo-bifemoral graft. The exclusion operation described in this paper offers the advantages of the non-resective treatment (since the aneurysm is not opened) and eliminates the axillo-femoral graft by direct aorto-iliac/femoral grafting in the extraperitoneal space.

The extraperitoneal approach to aortic aneurysmorraphy has numerous advantages. It eliminates bowel exposure, manipulation and the associated fluid and electrolyte loss of the transperitoneal approach. Because ileus is minimal or non-existent, as shown by our cases, patients are more comfortable without the nasogastric tube or gastrostomy that is frequently necessary in aneurysm surgery.

Access to the aneurysm neck, especially if the aneurysm is massive or if suprarenal aortic clamping becomes necessary, is much better using the extraperitoneal approach[4]. This approach also eliminates any difficulty with adhesions in patients who have had previous abdominal surgery and minimises the risk of adhesion formation postoperatively. The absence of the long midline abdominal incision also minimises impairment of respiratory function. Some of these advantages were well documented by Rob in 1963[5] and because of this, other surgeons have advocated routine extraperitoneal exposure for aorto-iliac reconstruction[6,7]. The exclusion operation offers the added advantage that the aneurysm sac is not opened. Because most of the bleeding during aneurysmorraphy occurs when the sac is opened, this blood loss is eliminated with exclusion of the aneurysm.

This operation combines the advantages of the extraperitoneal exposure and non-resective treatment while eliminating the disadvantages of extra anatomical grafting. It is therefore of great value in poor risk patients or in situations where support services are restricted. In our circumstances we find it the ideal operation for routine use in patients with infrarenal aortic iliac aneurysms.

The major disadvantage of the exclusion technique is that it is rather difficult to insert a tube graft for an aneurysm in which there is no iliac involvement. In these cases we would use the extraperitoneal approach but instead of excluding the aneurysm it would be laid open and dealt with in the same fashion as in the transperitoneal exposure; control of the right common iliac is obtained by insertion of intraluminal balloon catheter after the aneurysm has been opened.

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