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SHORT REPORT

Type III Thoracoabdominal Aortic Aneurysm Repair: A Combined Surgical and Endovascular Approach

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Introduction

Thoracoabdominal aortic aneurysm (TAAA) repair is a high-risk procedure and thoracic endovascular stenting has encouraging morbidity and mortality. We report a case of Type III TAAA repair in a patient with previous abdominal and thoracic aortic surgery, using a combined surgical and endovascular approach. This innovative method is a particularly attractive option in 'redo' operations such as this since it significantly reduces the extent of dissection and avoids thoracotomy.

Case Report

A 49 year old gentleman underwent elective infra-renal abdominal aortic aneurysm (AAA) repair in 1998; he also had a Type B dissection. In 1999 he had a 6.5 cm upper descending thoracic aortic aneurysm repaired. Follow-up CT revealed a 9.0 cm dilatation of the intervening native aorta (Fig. 1) with bilateral iliac aneurysms (3.0 and 4.5 cm).

Risk factors were hypertension and smoking. No genetic cause for his multiple aneurysms was found but there was histological evidence of medial degeneration. Examination revealed a non-tender epigastric aneurysm and a full complement of left sided infra-inguinal pulses, associated with a left popliteal aneurysm. On the right there was a thrombosed popliteal aneurysm. Cardiac and respiratory status were satisfactory and renal function was normal.

He underwent TAAA repair and bilateral iliac aneurysm repair with revascularisation of the visceral and renal arteries (Fig. 2) and subsequent endoluminal stent repair. Firstly the iliac aneurysms were repaired with a bifurcated Dacron graft. The proximal end was anastamosed end-to-end with the distal end of the previous infra-renal graft, and the distal limbs end-to-end with the iliac bifurcations. A second bifurcation graft was then anastomosed end-to-side to the anterior aspect of the implanted graft and two 8 mm Dacron grafts anastomosed either side. Visceral vessels were then revascularised (superior mesenteric, coeliac and renal arteries). Once these anastomoses were complete the vessel origins were ligated to eliminate competitive flows. A further 8 mm sidearm was added to the graft for endovascular access. A guidewire was inserted via the right brachial artery to catheterise the true lumen of the thoracic aorta and prevent deployment in the false lumen. Four Talent devices were then placed, via the graft sidearm, to exclude the aneurysm sac. Good placement was obtained; on-table completion angiography showed no endoleaks.

He spent four days in intensive care. On the sixth post-operative day he underwent fasciotomies for compartment syndrome of his right leg (in which a thrombosed popliteal aneurysm pre-existed) and the leg made a full recovery.

Discussion

TAAA repair remains a considerable challenge[1] and techniques that reduce the extent of the surgery are to be encouraged. These patients usually have significantly co-morbidity and redo surgery further compounds the problem. Thoracic endovascular stents have produces encouraging initial results (Dake)[2] but

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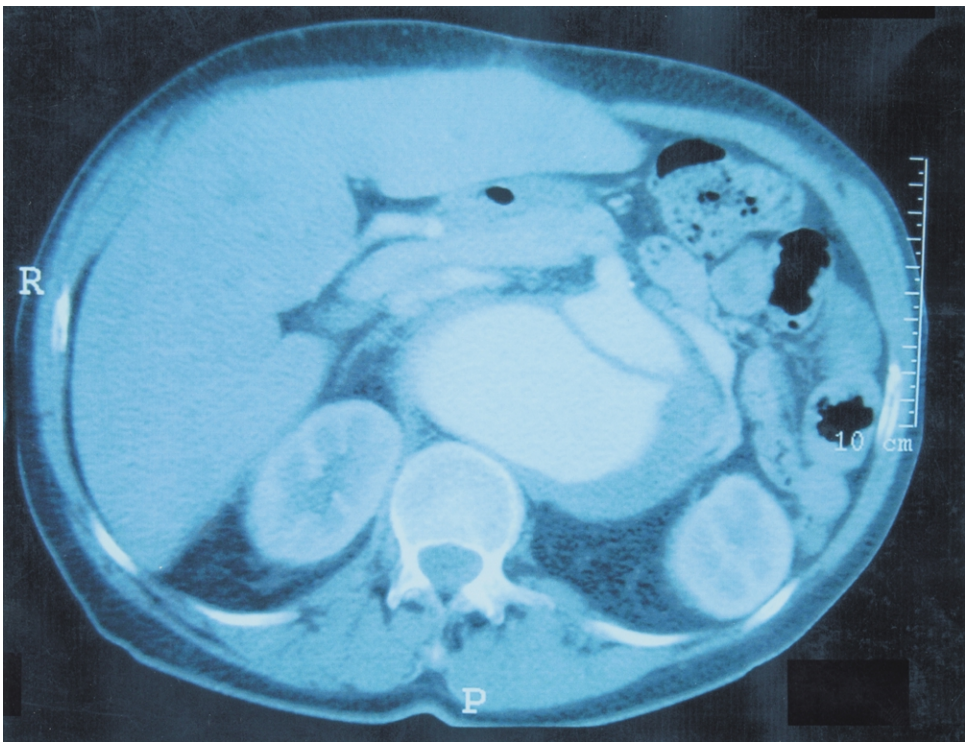

Fig. 1. CT scan showing a 9 cm dilatation of the native aorta between thoracic and abdominal grafts.

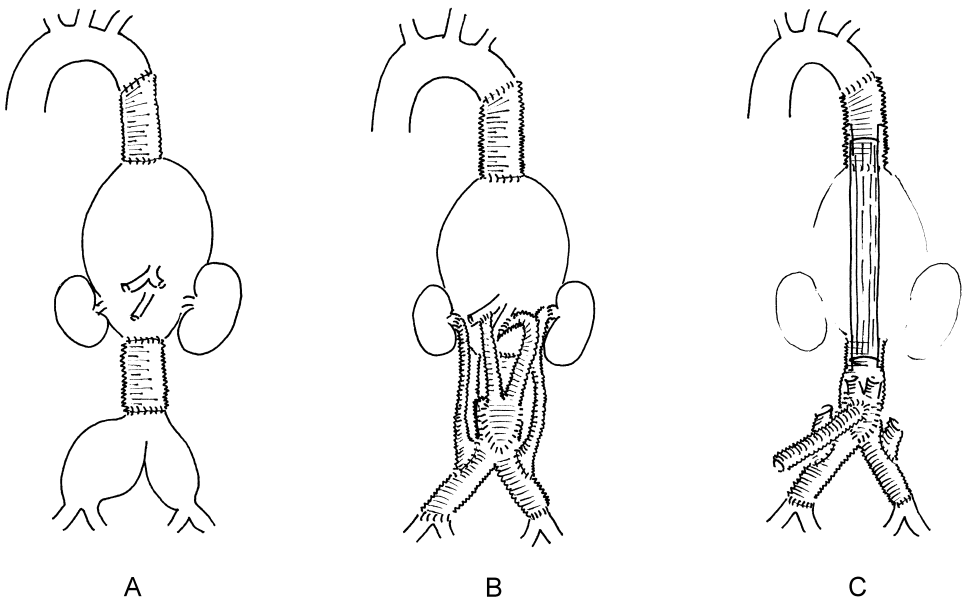

Fig. 2. Schematic representation of the thoracoabdominal aortic aneurysm repair. (A) The pre-operative situation; (B) following repair of the iliac aneurysms and revascularisation of the visceral arteries and renal arteries; (C) the stent deployed through the aneurysmal thoracoabdominal segment through a side arm.

have been limited by the need for visceral revascularisation.

Paraplegia is a serious complication when the whole thoracic aorta is repaired and endovascular repair appears to reduce this risk. There are at least two potential reasons for this apparently inexplicable observation. The first is the proximal deployment of the stent leaving the lower thoracic intercostal artery uncovered and supplied through back-filling through the lower part of the false lumen. The second is the reduced stress response that may protect the cord from a spinal compartment syndrome (paraplegia sometimes still occurs in the presence of a spinal drain).[3]

Our patient had not only had previous AAA repair but also thoracic aortic surgery. This presented the added problem of a redo-thoracotomy (which is associated with significant blood loss from the denuded pleural cavity). Endovascular repair avoided the need for this incision, and thereby reduced potential morbidity. Open surgical repair of the abdominal component allowed visceral revascularisation prior to the deployment of the graft and, as a result, no visceral ischaemia time. It also provided a conduit for radiological access via which the stents were deployed.

The immediate recovery was excellent other than the predictable ischaemia of the right leg, which recovered. The avoidance of paraplegia was a relief and was unexplained. Our only suggestion is that collaterals had developed following the previous aortic surgery so that the spinal cord was no longer dependent upon the remaining intercostal arteries. Certainly the presence of thrombus in the remaining aneurysmal segment of the thoracic aorta suggests that these intercostals may have already been occluded.

Few cases of combined endovascular and surgical repair have been documented,[4–6] and we found no reports involving aneurysmal native aorta between two grafts. This approach allows treatment of patients whose co-morbidity may have previously made them unsuitable for TAAA repair, and reduces the morbidity and mortality rates of these high-risk procedures.

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