Simultaneous treatment of thoracic and infrarenal aortic aneurysm using a combination of conventional surgery and endoluminal stent grafting

Abstract  
Introduction: Patients with multiple aortic aneurysms represent a small subgroup with the need for extensive surgical treatment at considerable risk. Endovascular treatment in combination with conventional operation is possible. We demonstrate a case with simultaneous exclusion of aneurysms of the descending thoracic and the infrarenal aorta to outline the technical obligations.  
Conclusion: Simultaneous exclusion of a thoracic and an abdominal aneurysm can be performed successfully by conventional infrarenal aortic replacement with bifurcated dacron prosthesis and endovascular implantation of a thoracic stent-graft within one operation.

Key words  
Aortic aneurysm · Combination therapy · Endovascular treatment

Introduction

Aneurysms of the thoracic aorta have been treated by conventional surgical repair for the last 48 years [1, 2]. Despite a continuous improvement in techniques leading to a reduction in morbidity and mortality, there is still a considerable operative risk associated with the procedure of graft interposition, chiefly related to major thoracotomy. The postoperative complications include bleeding, paraplegia, stroke, renal insufficiency, and the necessity for prolonged respiratory support.

The estimated incidence of thoracic aortic aneurysms is six cases per 100,000 person-years, mainly afflicting elderly male patients [3]. The frequent co-morbidities include arterial hypertension, coronary artery disease, and congestive heart failure. An additional infrarenal aortic aneurysm has been reported to occur in 10–20% of patients [4]. Without surgical treatment, the risk of rupture for thoracic aneurysms is high, with actuarial 1-year and 5-year survival rates of 60% and 20%, respectively [5, 6]. The operative mortality in large series range from 5% to 20% [6, 7].

With the introduction of endovascular transluminal stent-graft repair for aortic aneurysms in 1986 by Volodos and in 1991 by Parodi, a less-invasive therapeutic alternative became available [8, 9]. In 1992, Dake started implantations of stent-graft protheses in patients with thoracic aneurysms [10]. His experience up until October 1997 includes 124 patients with an operative mortality of 9.0% and a paraplegia rate of 3.0% in a detailed report on 103 patients [11, 12, 13]. In Dake’s series, the incidence of paraplegia was 13.6% and of death 4.5% in 22 patients undergoing simultaneous repair of thoracic and abdominal aneurysms [12].

Worldwide, more than 194 cases of thoracic repair by stent-graft have been reported, demonstrating the technical feasibility with different indications. The number of patients with combined repair is smaller – 22 cases. Nevertheless, there are no long-term results on effectiveness to allow us to evaluate the procedure. However, combined approaches have been rare so far. It was the aim of this case report to outline the technical obligations when using this approach.
Case report

An 63-year-old-woman presented with a 1-year history of intermittent back pains. Her medical history included arterial hypertension and coronary artery disease without evidence of myocardial infarction. In addition, renal insufficiency was diagnosed 25 years prior to admission and chronic hemodialysis was instituted 5 months preoperatively, possibly due to analgesic nephropathy. Peripheral vasculopathy included occlusive disease of pelvic and limb vessels. Preoperative medication included antihypertensives, including beta-blockers.

Physical examination revealed a blood pressure of 140/70 mmHg in both arms. There was a palpable pulsatile abdominal mass and palpable pulses in both groins.

A spiral computed-tomography (CT) examination of the thoracic and abdominal aorta revealed a thoracic aneurysm with a maximal diameter of 5.9 cm, commencing 5.4 cm distal to the origin of the left subclavian artery and extending 2.8 cm distally. The thoracic aortic diameters proximally and distally were 29 mm and 28 mm, respectively (Fig. 1a). Starting 20 mm infrarenally, a second bilobed aneurysm was seen with a maximal diameter of 4.7 cm. The aneurysm extended almost up to the aortic bifurcation (Fig. 1b). Angiography confirmed these findings. In addition, severe narrowing of the left common iliac artery was noted. The iliac vessels showed luminal diameters below 7 mm (Fig. 1c).

Preoperative cardiac evaluation included cardiac catheterization showing two-vessel disease with occlusion of the right coronary artery and 50% stenosis of left anterior descending coronary artery. Thallium scintigraphy did not demonstrate perfusion defects under stress conditions, therefore medical treatment was continued.

Treatment was deemed necessary for the thoracic aneurysm with a maximum diameter of 5.9 cm (Fig. 2a) and for the infrarenal aneurysm with a diameter of 4.78 cm (Fig. 3) because of the aneurysm’s size. Relating to the patients’ symptoms, the origin of the intermittent back pains could not be clearly differentiated be-