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Endovascular repair or medical treatment of acute type B aortic dissection? A comparison

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ABSTRACT

Introduction: The aim of this retrospective study was to compare the outcome of thoracic endovascular aortic repair (TEVAR) to that of medical therapy in patients with acute type B aortic dissection (TBD).
Materials and methods: From July 1996 to April 2008, 88 patients presenting with acute TBD underwent either TEVAR (group A, $n = 38$) or medical therapy (group B, $n = 50$). Indications for TEVAR were intractable pain, aortic branch compromise resulting in end-organ ischemia, rapid aortic dilatation and rupture. Follow-up was performed postinterventionally, at 3, 6 and 12 months and yearly thereafter and included clinical examinations and computed tomography (CT), as well as aortic diameter measurements and assessment of thrombosis.
Results: Mean follow-up was 33 months in group A and 36 months in group B. The overall mortality rate was 23.7% in group A and 24% in group B, where 4 patients died of late aortic rupture. In group A, complications included 9 endoleaks and 4 retrograde type A dissections, 3 patients were converted to open surgery and 2 needed secondary intervention. None of the patients developed paraplegia. In group B, 4 patients were converted to open surgery and 2 to TEVAR. The maximal aortic diameter increased in both groups. Regarding the extent of thrombosis, our analyses showed slightly better overall results after TEVAR, but they also showed a tendency towards approximation between the two groups during follow-up.
Conclusion: TEVAR is a feasible treatment option in acute TBD. However, several serious complications may occur during and after TEVAR and it should therefore be reserved to patients with life-threatening symptoms.

1. Introduction

The treatment of choice for acute type B aortic dissection (TBD) remains a matter of debate in the scientific community. However, there is widespread consensus that in patients with uncomplicated acute TBD, medical therapy is superior to open surgery [1–3]. Persistent pain, aortic dilatation, drug-resistant hypertension or dissection-related complications, such as rupture, impending rupture and end-organ ischemia are clear indications for either surgical intervention or thoracic endovascular aortic repair (TEVAR). As surgery continues to result in high mortality rates [4–7], depending on the complexity of the aortic dissection, TEVAR has been emerging as a less invasive and safe alternative to conventional surgery in patients with aortic disease. For more than a decade now, many authors have documented their experience with TEVAR [8–11]. However, to the best of our knowledge, there is only one study comparing the outcome of TEVAR to that of conservative treatment of TBD [12].

We have recently reported promising mid-term results in patients with acute TBD treated by TEVAR [13] and we have also reported on the results of volumetric measurements in patients with acute TBD treated either by TEVAR or conservatively [14].

The aim of the present retrospective study was to compare the outcome of TEVAR to that of conservative medical therapy in patients with acute TBD, based on data acquired in these two studies. The results were analyzed taking into account the remarkable differences between the two groups in terms of pre-treatment health status.

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Table 1
Patientïs characteristics.

	Stent	Medical
Patients	38	50
Male	29	37
Female	9	13
Mean age (years)	64 (35–89)	65 (40–84)
ASA I	2	0
ASA II	10	32
ASA III	10	15
ASA IV	0	3
ASA V	16	0
Hypertension	33	36
Diabetes mellitus	3	4
Chronic obstructive pulmonary disease	9	3
Chronic renal failure	5	7
Cardiovascular disease	11	10
Malignancy	1	3
Adipositas	11	8
Smoker	2	6

2. Materials and methods

2.1. Patients

From July 1996 to April 2008, a total of 88 patients were referred to our department with acute TBD. In 38 patients (mean age 64 years, range 35–89), intractable pain ($n = 15$), aortic branch compromise resulting in end-organ ischemia ($n = 15$), rapid aortic dilatation ($n = 5$) and rupture ($n = 3$) necessitated immediate intervention (group A). The decision for TEVAR was made by a team of vascular and cardiovascular surgeons, anesthesiologists and interventional radiologists. Complete written informed consent was obtained from the patients or relatives if the patient was on mechanical ventilation ($n = 6$). In the other 50 patients (mean age 65 years, range 40–84), the team decided on medical treatment (group B). The study was approved by the local ethical review board. Patient data are given in Table 1.

2.2. Aortic branch compromise

The diagnosis of aortic branch compromise was made on the basis of CT scans, angiography and clinical examinations.

In group A, 15 patients presented with aortic branch compromise, 10 of them with dynamic compromise (undulating dissecting lamella obstructing the ostium of a branch vessel), one with static compromise only (static extension of the dissection flap into a visceral artery) and 4 with both, static and dynamic compromise. Static compromise affected the celiac artery in two patients, the celiac and superior mesenteric arteries in one and the renal artery in two patients.

In group B, 5 patients presented with static compromise. It involved the celiac artery and the superior mesenteric artery in one patient, the superior mesenteric artery and the right kidney in two patients, the celiac trunk, the superior mesenteric artery and the right kidney in one patient and the right kidney in another one.

2.3. Diagnostic work-up

The diagnosis of dissection was established on the basis of CT scans and/or angiography and clinical examination. In each patient, contrast-enhanced helical CT with three-dimensional (3D) vascular reconstruction from the apex of the thorax down to the groin was obtained immediately after admission and diagnostic angiography at the time of stent-graft insertion. They provided the needed information on length and diameter of the aortic lesion and anchoring sites, and about involvement of important thoracic and abdominal branches, as well as about the anatomy of the vessels used for access. Up to May 1999, CT examinations were performed using a single-slice SDCT scanner (CT/i, GE Medical Systems, Milwaukee, WI, USA) and from May 1999 to June 2006 using a 4-row multi-slice scanner (Light Speed QX/i, GE Medical Systems, Milwaukee, WI, USA). Since June 2006, data have been acquired from a 64 detector-row MDCT scanner (Light Speed VCT, GE Medical Systems, Milwaukee, WI, USA) using a slice thickness of 1.25 mm with pitch 0.98 and a reconstruction interval of 0.6 mm in the standard reconstruction kernel. Scans were obtained using 120–150 ml of a nonionic contrast agent (Ultravist, Schering, Berlin, Germany) administered at a concentration of 300–370 mg I/ml and a flow rate of 4 ml/sec. The raw data were transferred to an independent workstation (Sun Ultra 60, Sun Microsystems, Mountain View, CA, USA) running the Advantage Windows software (AW4.0, GE Medical Systems, Milwaukee, WI, USA) for calculating MIP, curved reformats (Fig. 1) or 3D reconstructions. We do not routinely use ECG-gating.

2.4. Stent-grafts

Dimensions of the stent-grafts (SGs) were determined on the basis of the findings on preinterventional contrast-enhanced helical CT scans and angiography.

In group A, 48 Talent SGs (Medtronic AVE, Sunrise, FL, USA; length 100–150 mm, diameter 34–46 mm), 5 Excluder SGs (WL Gore and Associates, Inc., Flagstaff, AZ, USA; length 150 mm, diameter 40 mm) and 13 TAG SGs (WL Gore and Associates, Inc., Flagstaff, AZ, USA; length 100–200 mm, diameter 31–37 mm) were implanted during primary interventions. 18 patients received one SG each, 14 patients 2 SGs each, 4 patients 3 SGs each, and 2 patients 4 SGs each. 2 Talent SGs were implanted during secondary interventions.

In group B, two patients had to be converted to TEVAR. They received 1 Excluder SG (length 150 mm, diameter 37 mm) and three Talent SGs (length 160 mm, diameter 36–40 mm) respectively.

All patients were treated with SGs from our emergency kit containing Talent, Excluder and TAG SGs of various sizes (Talent: 80–167 mm in length and 16–46 mm in diameter, Excluder: 150–200 mm in length and 31–40 in diameter and TAG: 150–200 mm in length and 31–37 mm in diameter). Oversizing was 10–20%.

2.5. Proximal landing zones

In 13 patients, the origin of the left subclavian artery had to be completely crossed with the covered portion of the SG. In 7 of them, the origin of the left carotid artery was crossed with the bare springs of the SG. In 16 patients, the origin of the left subclavian artery was crossed with the bare springs of the SG and in 9 patients, it remained uncovered.

2.6. Technique

Between October 1998 and April 2008, all procedures were performed in an angiographic suite (Integris BV 3000, Phillips, Eindhoven, Netherlands, Europe) under fluoroscopic guidance by a team of experienced radiologists, anesthesiologists, cardiovascular and vascular surgeons, using general anesthesia and intubation. Preinterventionally, each patient received antibiotic prophylaxis consisting of a single shot of a Cefuroxim (1.5 g Curocef per patient, Glaxo Smith Kline, GB). The technical details of SG placement were described previously [8]. They have remained unchanged except for balloon dilatation, which we now avoid, as we observed a strong association between this technique and the occurrence of retrograde type A dissections [13,15].