Bifurcated Endograft in Aortoiliac Type C and D Lesions: Long-Term Results

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ABSTRACT

Purpose: To report long-term outcome when using a bifurcated aortic endograft for treatment of aortoiliac occlusive disease (AIOD) in Trans Atlantic Inter Society Consensus (TASC) classification C and D patients.

Materials and Methods: Between May 2001 and May 2009, 14 patients (11 men, 3 women) with aortoiliac TASC C and D type lesions and a mean age of 59 years ± 10 (range 41–73 years) were treated using a bifurcated aortic endograft. Although these patients were young, all were considered at high surgical risk. Patients were followed up clinically and by computed tomography (CT) every 3 months for 1 year and yearly thereafter.

Results: Endoprosthesis placement was performed in all patients with a technical success rate of 100%. There were no amputations or deaths at 30 days after the procedure. The mean follow-up was 62 months (range 11–96 months). One patient was lost during follow-up at 11 months, and another patient died of a nonrelated cause after 49 months. A single limb occlusion of the prosthesis was seen in two patients at 2 months and 7 months; both were successfully treated by intraarterial fibrinolysis. At a mean follow-up of 62 months, primary patency was 85.7%, and secondary patency was 100%.

Conclusions: This series shows promising long-term results following the use of a bifurcated aortic endograft for treatment of AIOD TASC C and D type lesions. Bifurcated aortic endograft is a good minimally invasive alternative to open surgery in high surgical risk patients.

ABBREVIATIONS

ABI = ankle-brachial index, AIOD = aortoiliac occlusive disease, TASC = Trans Atlantic Inter Society Consensus

There is controversy regarding the ideal therapeutic approach for aortoiliac occlusive disease (AIOD). Traditional treatment consists of endarterectomy and aortobifemoral bypass, with excellent long-term results. Surgical reconstruction offers the best overall patency rates of 80%–90% at 5–10 years (1). However, this excellent long-term outcome is associated with major complication rates of 8.3% and a 3.3% perioperative mortality rate (2). As promising alternatives to open surgery, several endovascular techniques have been progressively introduced in the aortoiliac territory with the development of "kissing balloon," "kissing stent," and "kissing stent graft" techniques. These techniques show acceptable results with primary patency rates after bare stent deployment of 74%–89.9% at 3 years and 74%–82% at 5 years (3–7). The use of covered stents might increase patency with primary patency rates of 84%–92% at 2 years (8,9).

Angioplasty with optional stent placement in a kissing technique is not always indicated because arteriosclerotic disease might extend into the distal aorta. Excessive stent overlap and radial mismatch of aortic lumen dead space around the protruding segment of the stents have been reported with failure of kissing stents in the aortic bifurcation (10,11).

A bifurcated aortic endovascular prosthesis has been used for > 10 years in the treatment of aortic aneurysmal disease. In 2005, we published our preliminary experience with the use of a bifurcated endoprosthesis as an alternative therapeutic option in the treatment of complex AIOD in selected patients with severe comorbid

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Table 1. Demographic Data, Symptoms, and Risk Factors

Risk Factors and Clinical Setting	No. Cases
Sex (male/female)	11/3
Age (y)	59 ± 10
Hypertension	10
Diabetes mellitus	4
Hypercholesterolemia	8
Current smoking	12
Ischemic heart disease	6
Chronic obstructive pulmonary disease	3
Chronic renal failure	2
Claudication	7
Chronic critical limb ischemia	7

conditions and critical limb ischemia (12). Our study showed that the use of a bifurcated endoprosthesis is a technically feasible and less invasive therapeutic alternative with promising good short-term results. Data for long-term follow-up were unavailable, however. The purpose of this article is to report the long-term outcome after endovascular treatment of nonaneurysmal AIOD using a bifurcated aortic endovascular prosthesis

MATERIALS AND METHODS

Between May 2001 and May 2009, 14 patients (11 men and 3 women) with a mean age of 59 years ± 10 (range 41–73 years) underwent endovascular treatment for AIOD using a bifurcated aortic endovascular prosthesis. Five of these patients were already part of a preliminary report (12). **Table 1** lists the patients' demographic data. Indications for treatment were critical limb ischemia (ulceration, gangrene, or rest pain) in seven patients (50%) and a history of severe claudication (< 200 m) in the remaining seven patients (50%). According to the Trans Atlantic Inter Society Consensus (TASC II) classification on the morphologic stratification of iliac lesions, all of these patients had complex stenoocclusive lesions extending into the distal aorta and were classified as TASC C and D (13).

All patients were deemed nonsurgical candidates because of high-risk factors such as cardiac disease, hostile abdomen, or obesity. A conventional endovascular approach such as the kissing stent was not indicated in these patients because complex arteriosclerotic lesions extended into the abdominal aorta.

Definitions

Technical success was defined as restored patency with a residual stenosis of < 30%. Clinical success was defined as at least a twofold improvement according to the Limb Status Grading System (14). A complication was defined as any untoward event after the procedure with a lasting unfavorable effect or an event requiring a change in management. Primary patency referred to uninterrupted patency with no procedures performed on or at the margins of the treated segment. Only procedures performed proximal or distal to the initially treated segment to treat progression of disease in an adjacent native vessel were exempted. Secondary patency was defined as any procedure that restored patency after thrombosis (15). Limb occlusion was defined as absence of flow through the device with or without intraluminal thrombosis (16).

Follow-Up Protocol

Clinical follow-up examination including palpable common femoral artery pulses, the presence or absence of claudication, and ankle-brachial index (ABI) measurement was performed at discharge; at 3, 6, 9, and 12 months; and every 6 months thereafter. Computed tomography (CT) angiography (nonenhanced images, 10-mm slice thickness; arterial-phase contrast-enhanced images, 2.5-mm slice thickness) was performed at each follow-up. After 2005, our internal protocol changed to the following: During the first year, follow-up and CT angiography were performed as mentioned previously (at 3, 6, 9, and 12 months); however, after the patient concluded the 12-month follow-up, control CT angiography was performed annually only.

Endovascular Procedure

All consecutive patients with AIOD received endovascular treatment according to the protocol approved by our local institutional review board. After giving written informed consent, all patients with an occlusion of at least one access vessel underwent a two-step procedure; otherwise, the endograft was placed directly after balloon dilation in the same session.

First, standard digital subtraction angiography was performed through a 5-F brachial (in cases of Leriche syndrome) or contralateral femoral access (side of one patent iliac axis) to delineate the extent and severity of AIOD (**Fig 1a** and **b**). In cases of total aortic or iliac occlusion, the occlusive segment was crossed using either a straight or an angled 0.035-inch wire (Radifocus Guide Wire M; Terumo, Europe N.V., Leuven, Belgium). Reentry devices were not needed in any patient in this series.

If the occlusive lesion was crossed in an intraluminal way, a 24-hour catheter-directed intraarterial fibrinolysis session was initiated using an open-ended perfusion wire (Medtronic Vascular, Danvers, Massachusetts). Technical details have been described previously (17,18). Control angiography after 24 hours was performed to confirm lumen restoration. The underlying stenotic lesions were dilated with angioplasty balloons (OPTA; Cordis, Miami, Florida) ranging from 6 × 40 mm to 8 × 40 mm in size depending on the original artery diameter. If the lesion was crossed in a subintimal way, initial angioplasty was performed using balloon catheters (OPTA) ranging from 4–6 mm in diameter to open a channel and enable later recanalization.