Endovascular Treatment of Aorto-iliac Aneurysms: Four-year Results of Iliac Branch Endograft

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WHAT THIS PAPER ADDS
This study provides an insight into the contemporary management of aorto-iliac aneurysms and of its early and mid-term results.

Introduction: The aim of this report was to analyse early and mid-term outcomes of endovascular treatment (endovascular aneurysm repair, EVAR) for aorto-iliac aneurysms with the use of an iliac branch device (IBD).
Report: A total of 85 EVAR procedures with IBD were electively carried out in 81 patients between September 2007 and August 2012. Technical success was obtained in 98.7% of the cases. The mean follow-up duration was 20.4 months (SD ± 15.4). There was one IBD occlusion (1.2%). Estimated 48 months' survival, freedom from re-intervention and branch occlusion were 76.7%, 88.3% and 98%, respectively.
Conclusions: EVAR for aorto-iliac aneurysms using IBD is an effective procedure with low complication and re-intervention rates at mid-term follow-up.

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The iliac branch device (IBD) has been proposed as an effective total endovascular solution for common iliac artery aneurysms (IAAs). However, most of the data come from single-centre experiences collecting small series of patients[1–3] and few reports are available about the long-term outcomes of this technique.[4,5] The aim of this study was to review our experience in the endovascular treatment of aorto-iliac aneurysms with the use of IBDs.

REPORT

From September 2007 to August 2012, 99 patients with aorto-iliac aneurysms underwent endovascular exclusion at two Italian academic hospitals. A total of 85 IBDs were implanted (71 Zenith Bifurcated Iliac sidebranch — ZBIS; 11 Zenith Helical Iliac sidebranch — ZHIS; and 3 bifurcated-bifurcated — bif-bif configuration, Cook, Bloomington, IN, USA) in 81 anatomically feasible patients. Eighteen additional patients who received treatment different from IBD (5 iliac sandwich, 3 multilayer stent and 10 internal iliac artery embolisation procedures) were excluded from the present analysis.

A total of 51 patients had IBD for unilateral common iliac artery (CIA) aneurysm (62.9%). Three of them had an isolated iliac aneurysm, of whom two were treated with a stand-alone IBD device. As many as 30 patients (37.1%) presented bilateral CIA aneurysm. In four of them (4.9%), a bilateral IBD exclusion was achieved. Out of the remaining 26 patients (32.1%), unilateral IBD was associated with contralateral IAA embolisation in 17 (20.9%), while 9 patients (11.1%) underwent direct overstenting into the external iliac artery (EIA) without any embolisation.

Ten patients (12.3%) with an ectatic hypogastric main trunk, presenting a landing zone between 10 and 14 mm in diameter and a minimum of 15 mm length, were treated with a large balloon-expandable covered bridging stent (Large Diameter Advanta V12, Atrium Medical, Hudson, NH, USA), 12 or 14 mm in diameter. Procedural technical success was achieved in 80 patients (98.7%) with no perioperative mortality. The unsuccessful case was due to proximal IBD side-branch collapse, probably related to the challenging anatomy of the iliac bifurcation. An external iliac-to-hypogastric artery surgical bypass was performed with restoration of the flow and without any postoperative complications. The mean hospitalisation time was 5 days (±3).

During the first 30 postoperative days, only one IBD occlusion was observed. One patient underwent thrombectomy and ilio-femoral artery bypass due to external endograft limb occlusion contralateral to IBD. In three patients (3.7%), a distal type I IBD endoleak was detected at the first computed tomography (CT) scan. As in all these cases a large covered stent was used in the internal iliac side branch (Large Diameter Advanta V12, Atrium Medical,

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Hudson, NH, USA), a significant association between the distal type I endoleak and ectatic hypogastric main trunk was observed (Fisher's exact test χ^2: 20.9; $p = 0.002$). These patients were conservatively managed and a strict surveillance protocol was planned in order to monitor the sac behaviour. At the moment, they are still under investigation and no sac enlargement has been recorded.

The mean follow-up duration was 20.4 months (SD $\pm$ 15.4). Seven patients (8.6%) died due to non-aneurysm-related causes with an estimated overall survival of 89.5% and 76.7% at 24 and 48 months, respectively (Fig. 1a). Aneurysm-related deaths, conversions to open repair or aneurysm ruptures did not occur. No additional IBD occlusion was observed, with an estimated IBD patency of 98% at 48 months.

Seven patients (8.6%) suffered from buttock claudication. This symptom occurred in 6 out of 30 patients treated for bilateral CIA aneurysms (20%) on the side of hypogastric exclusion and did not improve during follow-up. The remaining case was associated with the early IBD occlusion. No ipsilateral buttock claudication was observed in patients with a patent IBD in the follow-up.

Neither late proximal type I and III endoleak nor new cases of distal type I IBD endoleak were detected with the estimated freedom from any endoleak at 48 months being 88.3% (Fig. 1b). Three patients (3.7%) underwent a secondary procedure during follow-up, in only one case IBD-related. This patient revealed at the 3-year CT scan an asymptomatic pre-occlusive thrombosis of the external IBD segment, which was successfully treated with thrombolysis and stenting. The estimated freedom from re-intervention at 48 months was 88.3% (Fig. 1c).

DISCUSSION

In the last decade, a number of studies have assessed the feasibility and safety of this novel endovascular technique.[1–3] However, most series in the literature are based

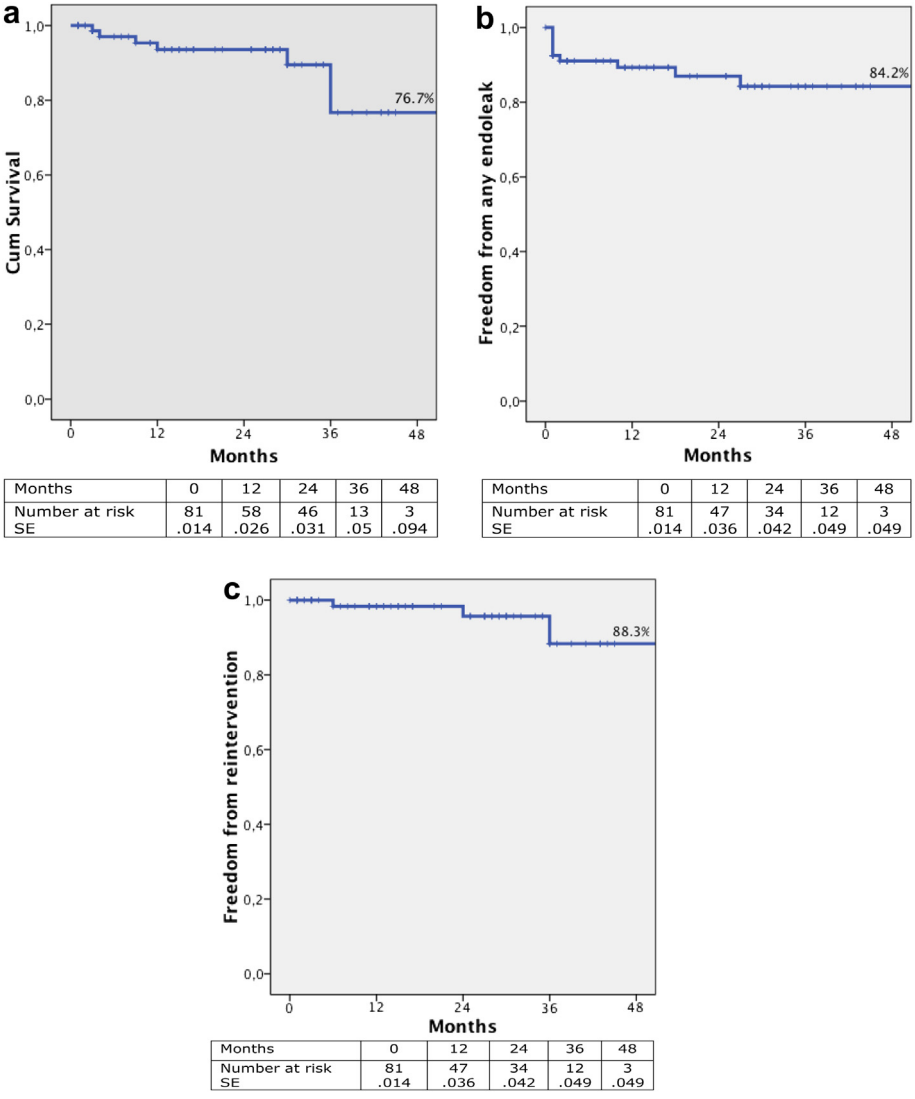

Figure 1. a. Kaplan—Meyer curve for cumulative survival, with number of patients at risk and standard error (SE) at different follow-up intervals. b. Kaplan—Meyer curve for freedom from any endoleak, with number of patients at risk and standard error (SE) at different follow-up intervals. c. Kaplan—Meyer curve for freedom from reintervention, with number of patients at risk and standard error (SE) at different follow-up intervals.

on a limited experience and little information is available about the midterm outcome of this technique.[4,5]

In this series we reported our experience with IBD in a selected group of patients achieving satisfactory early and follow-up results, with low rates of peri-procedural complications. The presence of an ectatic hypogastric artery was significantly associated with type Ib endoleak development during follow-up.

As all these patients received the same kind of stent and the endoleaks were located at the distal sealing zone in the ectatic hypogastric main trunk in all the cases, a possible explanation can be identified in a not-appropriate conformability of the stent under the pressure of dislodgement forces that normally develop during the postoperative period together with the aneurysm shrinkage process.

Based on our experience and in accordance with the current literature, we can argue that probably the aneurysmal involvement of the hypogastric artery might be considered an actual limit to the applicability of the IBD technique. In fact, even if technically feasible, both options involving either the landing in one of the two main hypogastric branches or the landing in the main hypogastric trunk have been demonstrated to be associated with an increased risk of complications and secondary procedures.

In conclusion, iliac branched endografts is an effective technique for IIA preservation during EVAR, when used in anatomically feasible patients. It offers a high technical success rate and a low incidence of complications in terms of re-interventions, endoleaks and limb occlusions at early and mid-term follow-up and may represent a valid technique in the case of bilateral iliac artery aneurysm.

CONFLICT OF INTEREST/FUNDING

None.

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