SHORT REPORT

Renal Artery Dissection during Repositioning of a Mal-deployed Aortic Endograft with Suprarenal Fixation

W.-H. Lee, G.-S. Jung*

Department of Radiology, Kosin University College of Medicine, 34, Amnam-Dong, Seo-Gu, Busan 602-702, South Korea

Submitted 21 May 2010; accepted 17 August 2010
Available online 5 October 2010

KEYWORDS
Abdominal aortic aneurysm; Aortic endograft; Endovascular aneurysm repair; Renal artery occlusion

Abstract
Endograft mal-deployment during endovascular aneurysm repair (EVAR) may cause renal artery (RA) occlusion. We report bilateral RA occlusion following insertion of an endograft with suprarenal barb fixation. Attempted salvage using the ‘pull-down’ technique caused right RA dissection. Despite bilateral RA stenting, the right kidney was atrophic on an ultrasound scan at 6 months. This potential hazard of devices with suprarenal barb fixation should be considered when repositioning is attempted.

Case Report

A 72-year-old woman was admitted for EVAR of an AAA. A preoperative aortogram showed 3.8-cm infrarenal aortic and 3.7-cm right common iliac artery aneurysms (Fig. 1(A)). After embolisation of the right internal iliac artery, the Zenith endograft (Cook Inc., Bloomington, IN, USA), which consists of a 103–26 mm main body and 71–12 mm both iliac leg extensions, was deployed using the standard transfemoral approach. A completion aortogram revealed a well-excluded AAA by the endograft without evidence of proximal or distal endoleak. However, neither renal artery was visualised (Fig. 1(B)). We believed that both renal arteries were covered by the mal-deployed endograft. We attempted to move the endograft caudally to uncover the renal artery orifices by using the technique described by Ruckert et al.² We report a case of renal artery dissection after using this method to reposition an endograft with suprarenal barb fixation.

* Corresponding author. Tel.: +82 51 990 6249; fax: +82 51 255 2764.
E-mail address: gsjung@medimail.co.kr (G.-S. Jung).

Previous studies have shown that endovascular aneurysm repair (EVAR) for abdominal aortic aneurysm (AAA) is both safe and effective. Inadvertent renal artery occlusion following graft mal-deployment is an uncommon complication¹–³ although several techniques for salvaging occluded renal arteries have been reported.¹–⁴ Of these, a simple pull-down technique using a guidewire was described by Ruckert et al.² We report a case of renal artery dissection after using this method to reposition an endograft with suprarenal barb fixation.

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doi:10.1016/j.ejvs.2010.08.025
Figure 1  (A) Preoperative aortogram shows an infrarenal aortic aneurysm extending to the right common iliac artery. Notice the bilateral patent renal arteries. (B) Completion aortogram reveals occlusion of both renal arteries by the proximally mal-deployed aortic endograft.

Figure 2  (A) Aortogram obtained after the pull-down technique shows faint opacification of both renal arteries. Notice the dissection in the right renal artery (arrowheads), which was overlooked during the procedure. (B) Final aortogram obtained after stent insertion in both renal arteries, shows opened left renal artery. (C) Selective right renal angiogram reveals diffuse dissection of the artery.
Terumo, Tokyo, Japan) was passed across the endograft bifurcation and exteriorised through the contralateral access site. Then, a downward force was simultaneously applied twice on the guidewire exteriorised from bilateral groins. The aortic endograft was moved caudally by approximately 3 mm. An aortogram revealed faint opacification of both renal arteries, but dissection in the right renal artery was developed, which was overlooked during the procedure (Fig. 2(A)). It was considered that the aortic endograft still covered the renal artery orifice for about 35 min. Express LD stents measuring $6 \times 17$ mm and $8 \times 27$ mm (Boston Scientific, Natick, MA, USA) were deployed through the right femoral artery access in the right renal artery and through the left brachial artery access in the left renal artery, respectively, both using a 7F guiding sheath. Final angiogram revealed restoration of blood flow to the left renal artery (Fig. 2(B)). However, the right renal artery was compromised with diffuse dissection (Fig. 2(C)).

The creatinine level was elevated during 3 weeks of the postoperative period (range, 133–177 $\mu$mol l$^{-1}$). Six months later, ultrasound demonstrated an atrophied right kidney and hypertrophied left kidney.

Discussion

Renal artery occlusion after EVAR is an uncommon complication, which is usually caused by impingement of the proximal edge of the graft on the renal orifices owing to a mal-deployed aortic endograft. Ruckert et al.$^2$ described an interesting technique for salvaging a proximally mal-deployed endograft. By placing a guidewire across the endograft bifurcation, they were able to pull the endograft caudally. We encountered occlusions of both renal arteries as a result of inaccurate graft deployment. We attempted to reposition the endograft by using the pull-down technique with a guidewire, as described by Ruckert et al. who used the Vanguard stent graft (Boston Scientific Corp., Oakland, NJ, USA). The aortic endograft was moved caudally by approximately 3 mm. Contrary to our expectation, however, extensive dissection of right renal artery occurred, which progressed to renal infarction. The current case has a point of distinct difference from the former case of Ruckert et al. One of the most distinctive features of the Zenith device we used is the presence of nine caudally oriented barbs in the uncovered suprarenal stent. The barbs enhance suprarenal fixation and prevent migration. We presumed that the barbs caused renal artery dissection while pulling down the endograft. Although this complication is a potential hazard of repositioning endografts with suprarenal barb fixation, it is unlikely that open surgical revascularisation could be achieved with sufficient speed to prevent renal infarction. Awareness of this hazard is therefore crucial and equipment should be available to allow rapid renal artery stenting when required. This allowed preservation of left renal artery perfusion in this patient and obviated the need for long-term dialysis.

Conflict of Interest/Funding

None.

References