Late renal artery stent fracture with pseudoaneurysm after fenestrated endovascular abdominal aortic aneurysm repair

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ABSTRACT

We report the case of an 81-year-old man incidentally found to have a complete transverse stent fracture of a left renal artery covered stent associated with a pseudoaneurysm while being investigated with digital subtraction angiography for an arterial cause of a nonhealing ulcer on his right great toe. He had a fenestrated endovascular abdominal aortic aneurysm repair 11 years ago with covered stenting of both renal arteries. Although he was asymptomatic, a second left renal artery covered stent was successfully placed across the fractured stent to eliminate the risk of rupture. Follow-up imaging showed patent stent and exclusion of the aneurysm. This case highlights another complication of fenestrated endovascular aneurysm repair that needs to be ruled out on surveillance imaging. (J Vasc Surg Cases and Innovative Techniques 2019;5:149-51.)

Keywords: FEVAR; Fenestrated; Aneurysm; Renal stent; Complication

Endovascular aneurysm repair (EVAR) for abdominal aortic aneurysms (AAAs) has several issues. One of these unique factors is a hostile neck, which is contraindicated in EVAR. Fenestrated stent endografts have been employed to provide optimal fixation in unfavorable proximal seal zones due to short-neck aneurysms. Some of the risks associated with fenestrated EVAR (FEVAR) are migration, occlusion, and stent fractures contributing to endoleaks, which are the most common, with abundant literature emphasizing the importance of postoperative surveillance.[1-3] The patient consented to publication of this case report.

CASE REPORT

We present a case of a transverse renal artery stent fracture with pseudoaneurysm formation 11 years after FEVAR. In 2006, an 81-year-old man was treated with a Zenith fenestrated stent endograft[4] (Cook Medical, Bloomington, Ind) for a juxtarenal AAA measuring 67 mm. Covered balloon-expandable Advanta V12 stents (Atrium Medical, Hudson, NH) were placed through the fenestrations for the right and left renal arteries.

Baseline imaging at 6 months postoperatively showed a well-aligned fenestrated stent endograft with no evidence of an endoleak or renal artery stent fractures (Fig 1). The patient was monitored annually for a period of 9 years, with plain radiography and ultrasound imaging revealing no evidence of an endoleak and a reduction in the size of his AAA. The patient presented with a nonhealing leg ulcer 2 years after he was lost to annual postoperative surveillance of his fenestrated endovascular graft insertion. Lower limb digital subtraction angiography to investigate the nonhealing ulcer on the right great toe incidentally revealed a left renal artery pseudoaneurysm in between the two ends of the transversely fractured stent in the lumen of the left renal artery (Fig 2, *A*). Between the fenestrated stent endograft insertion and the discovery of the renal artery stent fracture, the patient had had no trauma. A plain abdominal radiograph was taken to confirm the left renal artery stent fracture (Fig 2, *B*).

Subsequent computed tomography (CT) angiography highlighted the complete transverse fracture at the midpoint of the left renal artery stent, giving rise to the pseudoaneurysm. There was no evidence of stent migration, and normal flow was maintained. The patient was asymptomatic from the lesion. It was decided to actively manage the left renal artery stent fracture with the pseudoaneurysm. Therefore, a second covered renal artery stent was placed inside the previous one to prevent complications from a pseudoaneurysm rupture (Fig 3). The new Advanta V12 stent (6 × 22 mm) was positioned inside the fractured stent and inflated into place with success. Despite the original Advanta V12 stent's fracturing after 11 years, we had limited options and used the same stent for the second time because of the optimal size and length of the stent. Follow-up CT angiography performed 6 weeks later confirmed the patent lumen of the covered second left renal artery stent with no visible aneurysmal filling.

DISCUSSION

Up to 20% of patients have AAA neck morphology that is not suitable for conventional bifurcated EVAR, usually because of a short aortic aneurysmal neck.[5] One solution to repair AAAs with short aortic aneurysmal necks is a fenestrated stent endograft with branch stents for visceral arteries. Again, this is not without complications. Caudal migration of the proximal endograft occurs in 20% to 30% of FEVAR and within the first 12 months,

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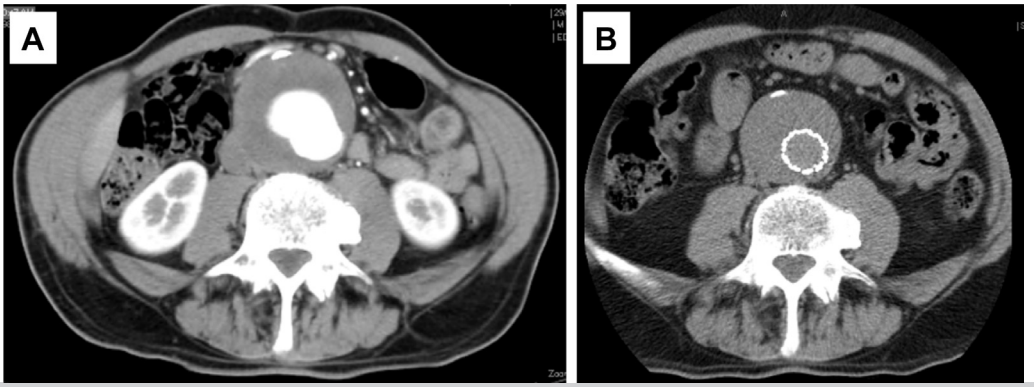

Fig 1. A, Computed tomography (CT) of the abdomen revealing a 67-mm abdominal aortic aneurysm (AAA). **B,** Baseline imaging at 6 months after repair of the AAA with an endovascular graft.

which may lead to stent fractures.[6] Stents placed in the left renal artery, as in the case presented here, are found to be more susceptible to fracture compared with stents placed in the right renal artery because of increased renal mobility during breathing.[7,8] Stent fracture with an associated pseudoaneurysm is a relatively rare complication.

Ongoing management for this case involved placing a second renal artery stent inside the lumen of the first fractured stent to prevent complications from rupture of the pseudoaneurysm, as reported by Aranzulla et al.[9] After much consideration of how to treat the pseudoaneurysm including open surgical approach[10] and percutaneous technique with covered stent and coil embolization,[11] we would not have intervened in the absence of a pseudoaneurysm and would have continued to monitor closely for in-stent thrombosis and change in size of the renal substance or function. The delay in presentation of this case highlights the importance of close, long-term postoperative surveillance. It appeared that this patient had been lost to follow-up for a couple of years before the incidental discovery of the left renal artery stent fracture, and surveillance imaging has now recommenced. Annual imaging of the stent endograft by ultrasound was not sufficient to detect the lesion in this patient.

The Society for Vascular Surgery guidelines[2] recommend color duplex ultrasound and CT angiography for post-FEVAR surveillance. The literature suggests that CT angiography is the current reference standard for surveillance postoperatively.[12] The role of the abdominal radiograph after FEVAR has been underused. It is a universally accessible modality of imaging[13] that can be used to detect postoperative complications including stent fractures.[14]

This case highlights one of the delayed complications of a hostile neck and its management and reinforces the need for lifelong surveillance.

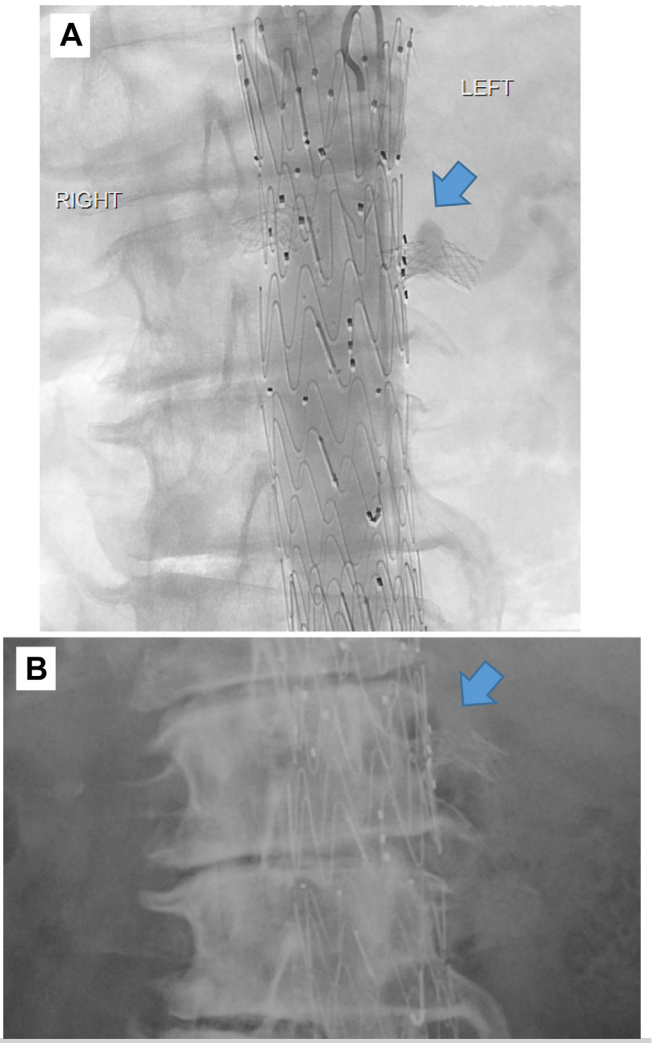

Fig 2. A, Digital subtraction angiography showing the left renal artery stent fracture and pseudoaneurysm (*arrow*). **B,** Plain abdominal radiograph showing the left renal artery stent fracture (*arrow*).

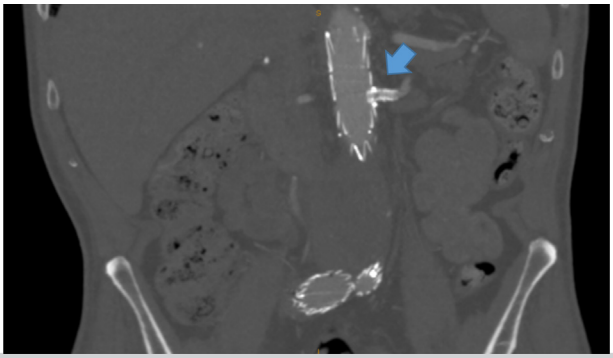

Fig 3. Computed tomography (CT) angiography showing the left renal artery stent fracture repaired with a second stent inflated in place, which is patent and excluding the aneurysm (*arrow*).

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