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CASE REPORT

Endovascular Aneurysm Repair With Re-entry Closure in a Patient With Abdominal Aortic Aneurysm Concomitant With Acute Type B Aortic Dissection

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Introduction: Abdominal aortic aneurysm (AAA) concomitant with acute aortic dissection is rare.
Case report: An acute type B aortic dissection involving AAA in a 58 year old woman is described. Computed tomography angiography demonstrated that the false lumen of the abdominal aorta including the aneurysm remained patent, secondary to entry sites in the abdominal aorta, bilateral external iliac arteries, and a membrane tear of the left renal artery (LRA). The aneurysm was isolated by endovascular aneurysm repair and LRA stenting; all entry sites were occluded by endovascular treatment that included covered stenting of the LRA. Imaging performed three months after the procedure confirmed complete thrombosis of the false lumen and AAA sac shrinkage.
Discussion: Endovascular treatment with covered stents is reported as an alternative strategy for treatment of AAA concomitant with acute aortic dissection involving a visceral artery.

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INTRODUCTION

Recent reports have demonstrated good outcomes for thoracic endovascular aortic repair for uncomplicated type B dissection.[1] However, a patent false lumen of the distal part of the thoracic or abdominal aorta could lead to aortic enlargement owing to residual re-entry sites in the abdominal aorta and related visceral arteries.[2] Moreover, closing all re-entry sites in the abdominal aorta and visceral arteries during endovascular treatment may be difficult.

A rare case is described of abdominal aortic aneurysm (AAA) concomitant with type B aortic dissection with entry sites in the abdominal aorta and left renal artery (LRA), which was successfully managed by endovascular aneurysm repair (EVAR) with covered LRA stenting.

The dissection is considered to be a retrograde type B dissection from the AAA.

CASE REPORT

A 58 year old woman with a history of hypertension was admitted to hospital due to sudden onset upper back pain. Computed tomography angiography (CTA) showed an infrarenal AAA (maximum diameter, 47 mm) and acute type B aortic dissection extending from the distal aortic arch to the external iliac arteries. It was assumed that the dissection started at the AAA and advanced retrogradely to the thoracic aorta. There was complete thrombosis of the false lumen of the thoracic and suprarenal abdominal aorta. However, the false lumen of the infrarenal abdominal aorta including the aneurysmal part, remained patent owing to entry sites in the abdominal aorta, external iliac arteries, and a LRA membrane tear (Fig. 1A—D). The coeliac, superior mesenteric, and right renal arteries derived perfusion from the true aortic lumen.

Though the dissection was uncomplicated, it advanced to the wall of AAA. Therefore, it was decided to perform EVAR in the subacute phase to avoid aneurysmal rupture. It was one month after onset followed by medical management. Isolating the aneurysm to avoid rupture required sealing of all entry sites in the false lumen involving the AAA, including the abdominal aorta and LRA membrane tears. Accordingly, the entry sites were sealed while preserving LRA perfusion with the Viabahn endoprosthesis (W.L. Gore and Associates, Newark, DE, USA).

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First, to prevent a type II endoleak from the inferior mesenteric artery (IMA), embolisation of the IMA derived from the false lumen via the abdominal entry site was carried out using the Amplatzer Vascular Plug 4 (8 mm; St. Jude Medical, Plymouth, MN, USA). Next, EVAR was performed. Iliac extensions (28 × 82 mm; Medtronic, Minneapolis, MN, USA) and an aortic extender (28.5 × 33 mm; W.L. Gore and Associates) were deployed to seal the entry site within the abdominal aorta (Fig. 2A). The Excluder bifurcated stent graft (23 × 12 × 140 mm; W.L. Gore and Associates) and its contralateral limb (right: 16 × 12 × 100 mm; left: 16 × 10 × 100 mm; WL Gore and Associates) were deployed between the infrarenal AAA and both common iliac arteries, followed by covered LRA stenting. A 7 F guiding sheath and a Viabahn endoprosthesis (11 × 50 mm; W.L. Gore and Associates) were inserted through the left brachial artery and deployed to extend from the abdominal aorta membrane tear to the entry site of the LRA, with preservation of a branch of the renal artery (Fig. 2B and C). Additionally, another Viabahn endoprosthesis (11 × 50 mm; W.L. Gore and Associates) was deployed to the left external iliac artery to seal its re-entry site. Further, stent grafting of the right common iliac artery and external iliac artery membrane tear was performed. To preserve right internal iliac artery perfusion, the sandwich technique was used with two Viabahn endoprostheses (external: 11 × 50 mm; internal: 11 × 50 mm; W.L. Gore and Associates) (Fig. 2D). Completion angiography showed a slightly patent false lumen via the right common iliac artery following the incomplete sandwich technique (Fig. 2E and F).

The patient's hospital course was uneventful. Since the post-operative CTA revealed a gutter endoleak from the right common iliac artery, embolisation of the right internal iliac artery was performed and the right limb extended to the right external iliac artery two weeks post-operatively. Follow up CTA after three months confirmed complete thrombosis of the false lumen in the abdominal aorta with preserved LRA patency. Follow up imaging confirmed absence of endoleak, AAA sac shrinkage, and remodelling of the dissected aorta (Fig. 3A—C). The remodelling was confirmed on computed tomography (CT) scans at six months and one year after surgery.

DISCUSSION

AAA concomitant with acute aortic dissection is a rare condition.[3,4] The combination of degenerative aneurysm and acute dissection increases the risk of abdominal aortic rupture.[4] Although early operation may be desirable to avoid rupture, acute phase surgery is associated with high risks because of the fragility of the aortic wall. The optimal timing of surgical treatment remains unclear. The aortic wall undergoes fibrosis in the subacute phase (two weeks to three months), enabling safe surgery.[5] Endovascular surgery for aortic dissection in the subacute phase has been reported to be safe and facilitates aortic remodelling.[6,7] Here

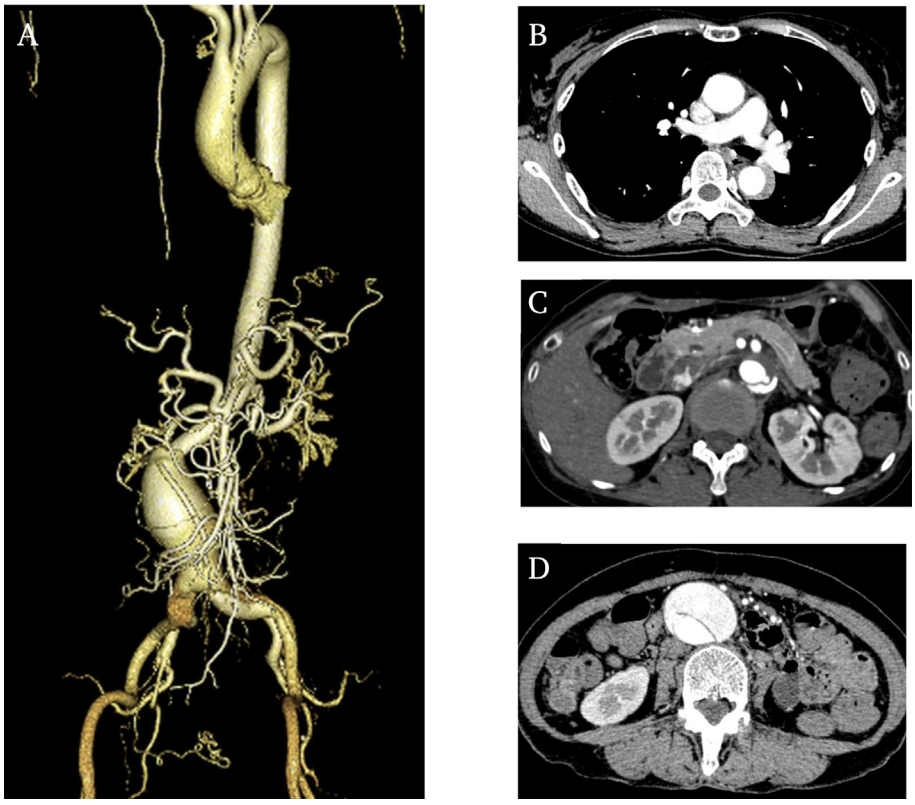

Figure 1. (A) Pre-operative enhanced computed tomography (CT) showing thrombosed type B dissection and abdominal dissected aneurysm. (B) The false lumen at pulmonary artery level is thrombosed. (C) Enhanced CT scan showing a re-entry point at the base of the left renal artery. (D) Enhanced CT scan showing a 47 mm diameter abdominal dissected aneurysm with re-entry in the abdominal aorta.

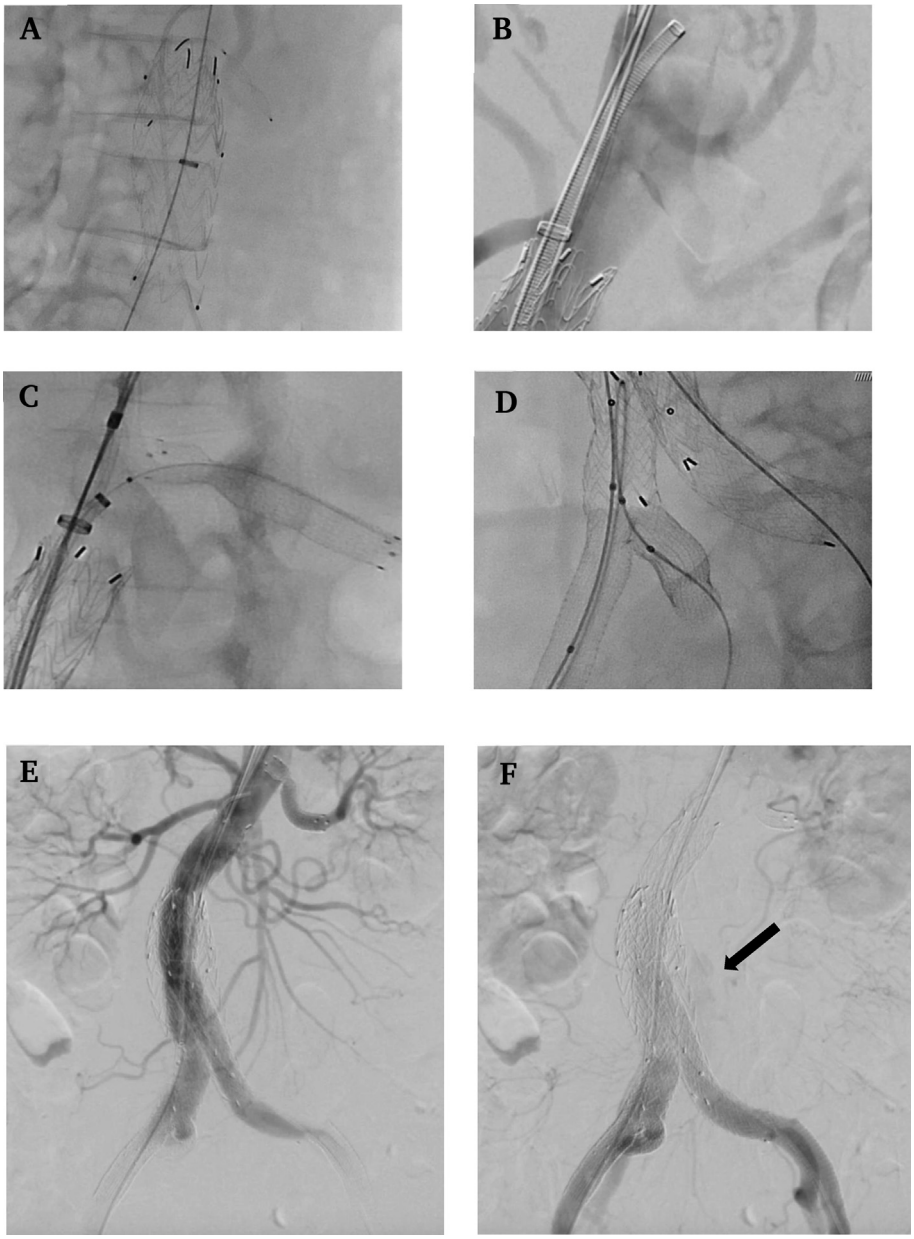

Figure 2. Intra-procedural findings. (A) The re-entry in the abdominal aorta is closed using iliac extensions (Medtronic, Minneapolis, MN, USA) and an aortic extender (WL Gore and Associates). Embolisation of the inferior mesenteric artery is performed using the Amplatzer Vascular Plug 4 (St. Jude Medical, Plymouth, MN, USA). (B) The left renal artery originates from the false lumen. (C) The Viabahn endoprosthesis (WL Gore and Associates) occludes the re-entry of the left renal artery with preserved renal blood flow. (D) Perfusion of the right internal iliac artery is preserved using the sandwich technique with two Viabahn endoprostheses. (E) Completion angiography in the early phase confirms absence of type Ia endoleak and any residual re-entry of the abdominal aorta and left renal artery. (F) Completion angiography in the late phase demonstrates a slightly patent false lumen via the right common iliac artery following the incomplete sandwich technique.

it was decided to perform an endovascular procedure in the subacute phase after confirming the absence of aortic rupture.

In the treatment of AAA concomitant with aortic dissection, it is necessary to occlude all entry sites into the false lumen around the aneurysm. If pre-operative CT indicates that not all entry sites can be occluded using an endovascular approach, open surgery should be considered. Since in this case pre-operative imaging confirmed that all entry sites could be occluded, including EVAR and covered stenting of the LRA, endovascular treatment to isolate the aneurysm was carried out.

Covered stenting of a visceral artery may be an option during endovascular treatment of aortic dissection involving that visceral artery, particularly if the dissection involves both the abdominal aorta membrane tear and the entry site of the aortic branches, as in this case. This technique used commercially available devices and did not require device

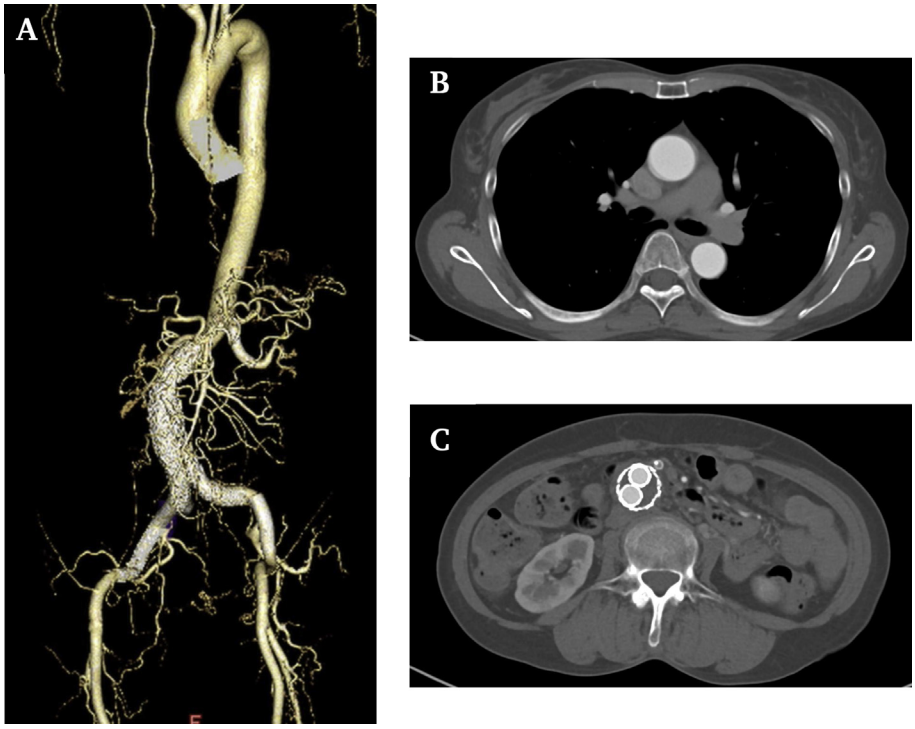

Figure 3. (A) Follow up computed tomography (CT) angiography three months post-operatively confirming patency of the left renal artery. (B) Enhanced CT confirming complete remodelling of the dissected false lumen of the descending aorta. (C) Enhanced CT confirming absence of endoleak and demonstrating complete thrombosis and shrinkage of the abdominal dissected aneurysm sac.

modifications. It may also be applicable in emergencies, such as aortic aneurysm rupture or acute complicated aortic dissection.

In conclusion, endovascular treatment with covered stents is reported as an alternative strategy for treatment of AAA concomitant with acute aortic dissection involving a visceral artery.

CONFLICTS OF INTEREST

None.

FUNDING

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