A rare case of aortocaval fistula caused by type I endoleak after endovascular repair of abdominal aortic aneurysm

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ABSTRACT

In this rare case, an aortocaval fistula caused by a type I endoleak following endovascular repair of an abdominal aortic aneurysm (AAA) in a 75-year-old man was treated successfully with repeat endovascular aortic stent implantation. Postoperatively, the patient's symptoms were significantly improved, and angiography at nine months showed no endoleak in the aneurysm and no occlusion in the compressed inferior vena cava. Endovascular interventional surgery may be a safe and effective approach to treating AAA with concomitant aortocaval fistula. The use of covered stents to isolate the fistula from the venous side may not be necessary in the first stage of surgery.

KEYWORDS

Aortocaval fistula – Abdominal aortic aneurysm – Inferior vena cava – I endoleak – Endovascular aneurysm repair

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Aortocaval fistula (ACF) is a rare and extremely dangerous complication of an abdominal aortic aneurysm (AAA), and patients often succumb to cardiac failure.¹ Most ACFs are diagnosed incidentally at the time of rupture and are rarely the primary indication for repair. With advances in surgical techniques and medical equipment, endovascular interventional therapy shows significant advantages. We report a case of ACF caused by a type I endoleak following endovascular repair of an AAA, which was resolved by repeat endovascular stent implantation.

Case history

A 75-year-old man was admitted to our institution with sudden pain at the waist lasting for half a day. Emergency enhanced computed tomography (CT) suggested rupture of an AAA with a diameter of 10cm following stent implantation and an ACF (Fig 1a). The patient showed no signs of shock or acute congestive heart failure but his haemodynamic state was suspected to be only temporarily stable and the conclusion was that emergency surgery was necessary. A review of his medical history revealed that he had undergone endovascular aneurysm repair (EVAR) for AAA five years earlier at another institution with a unibody stent graft but no re-examination was performed thereafter. A diagnosis of ruptured AAA with ACF was made and emergency endovascular interventional treatment was scheduled.

On angiography at the T12 level via the right femoral artery performed under general anaesthesia, the previously implanted stent and visceral arteries could all be visualised, and a type I endoleak was noted in the proximal end of the stent. The right lower part of the aneurysm body had ruptured into the inferior vena cava (IVC). The IVC at the level of the AAA showed severe stenosis (Fig 1b).

As the distance between the right renal artery and the coated area of the previously implanted stent was approximately 30mm, an aortic cuff (25mm x 45mm; Medtronic, Minneapolis, MN, US) was introduced via the left femoral artery, covering the area from the original stent to the origin of the right renal artery. A second cuff (32mm x 45mm; Medtronic) was introduced subsequently because of an endoleak near the IVC. Finally, angiography showed that the AAA was well isolated and a small type I endoleak remained in the proximal end of the cuff. The IVC was not visible in the delayed imaging phase (Fig 1c).

The patient's pain at the waist resolved completely within two days of the operation. Three months later, repeated CT angiography of the abdominal aorta showed a satisfactory outcome with no endoleak (Fig 2a). At nine months after surgery, the patient had no discomfort but his lower extremities were slightly swollen, as before. Angiography via femoral artery puncture showed that the AAA was completely isolated and the IVC was not visible in the delayed imaging phase (Fig 2b). Angiography via femoral

vein puncture revealed that the compressed IVC still had severe stenosis and that there was no radiocontrast agent in the AAA (Fig 2c).

Discussion

A major question regarding the treatment strategy for the present case was whether the fistula from the venous side should be isolated simultaneously to prevent a type II endoleak since there is no uniform international standard currently. According to the literature, most ACF cases do not develop an endoleak following EVAR surgery.^{2,5} One patient developed a persistent type II endoleak, which was isolated by covered stents via the IVC in a two-stage operation,⁴ and one patient received stent implantations in a single procedure via both the aortic aneurysm and IVC to prevent an endoleak.⁵

In our patient, in addition to the ACF, there was severe stenosis in the IVC due to compression by the aneurysm. It was decided that the covered stents should not be

reimplanted in the IVC to block the fistula as the stents might not be opened completely and thrombus related occlusion in the stents could occur in the long term, potentially causing rupture of the IVC. However, conservative observation without any intervention at the fistula from the venous side could retain the arteriovenous connection or lead to intra-aneurysm thrombogenesis and even thrombosis in the IVC.

Given the above risks, the decision was made to treat the ruptured AAA in the first stage of surgery and to leave the ACF to be treated in a second operation following close observation. Re-examination at three and nine months after surgery showed no endoleak from the aneurysm, and no occlusion in the IVC, suggesting the treatment had been successful and the outcome was favourable. Consequently, it appears that use of covered stents to isolate the fistula from the venous side may be not necessary initially. Instead, with close follow-up observation of the venous flow situation, if an ACF arises again, a second operation can then be performed to deal with it. Nevertheless, more

Figure 1 A) Preoperative emergency enhanced axial computed tomography showing rupture of an abdominal aortic aneurysm and aortocaval fistula (red arrow) B) Angiography prior to release of the cuffs showing contrast medium flowing out of the original stent, forming a type I endoleak, and that the inferior vena cava (IVC) was visible. The red arrow indicates the aortocaval fistula. C) Angiography following release of the cuffs showing the IVC was no longer visible, suggesting satisfactory isolation. The white arrow indicates the small type I endoleak remaining in the proximal end of the cuff.

research is needed to verify the long-term safety and efficacy of this approach.

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