Transvenous endovascular repair of symptomatic type II endoleak following endovascular repair of a ruptured common iliac aneurysm with arteriovenous fistula

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ABSTRACT
Arteriovenous fistula (AVF) is an uncommon presentation of ruptured aortoiliac aneurysm (rAIA). Symptomatic persistence of an AVF fed by a type II endoleak after endovascular aneurysm repair (EVAR) for rAIA is rare, with little in the literature to guide practice. We present a novel transvenous approach to treatment of symptomatic type II endoleak after EVAR for rAIA with AVF. A transvenous approach avoids complex arterial access and the need for stenting in the venous system. This technique should be considered in patients with persistent AVF after EVAR with ongoing symptomatic type II endoleak. (J Vasc Surg Cases and Innovative Techniques 2020;6:614–7.)

Keywords: Aortocaval fistula; Endovascular aneurysm repair (EVAR); Type II endoleak; Inferior vena cava (IVC); Transcaval access

Aortoiliac arteriovenous fistulae (AVF) in the context of abdominal iliac aneurysm (AIA) is rare, with an incidence of <1%.1 Common causes of symptomatic presentation include lower back pain, abdominal tenderness, claudication, urinary symptoms, and lower limb oedema.1

AIA with AVF may be repaired via open or endovascular approaches. Although endovascular intervention is associated with reduced morbidity and mortality, a risk of type II endoleak in the presence of AVF is a concern as there is an effective open flow system that can perpetuate the endoleak and associated complications.2

We report a case of successful endovascular coiling of symptomatic type II endoleak after endovascular aneurysm repair (EVAR) for AIA with AVF via a transvenous approach. Patient consent was obtained for publication of this case and associated imaging.

CASE REPORT
A 75-year-old man who had previously undergone emergency endovascular repair of a ruptured large right common iliac aneurysm with acute AVF in another hospital presented to our institution in November 2018 with worsening cardiac failure, significant shortness of breath, orthopnea, and bilateral lower limb oedema. These symptoms were in association with persistent type II endoleak with AVF, known severe mitral incompetence along with associated tricuspid incompetence, pulmonary hypertension, and a dilated inferior vena cava (IVC). The patient had a background history of giant cell arteritis (on prednisone and methotrexate) with previous ascending aortic repair with biomechanical aortic valve replacement and coronary artery grafting. A computed tomography scan confirmed the arteriovenous communication with type II endoleak from large lumbar arteries in the distal aorta (Fig 1). It was felt that initial treatment of the AVF may help the symptomatic status of the patient before more complex treatment for the cardiac valve dysfunction. It was decided to treat the type II endoleak using a transvenous approach from the right common femoral vein through the AVF and into the aneurysm sac with coiling of the lumbar artery and distal aorta posteriorly to the previous endovascular graft (Fig 2). Detachable coils (Concerto coils, Medtronic, Dublin, Ireland) were used to ensure stable placement before detachment. After embolisation of the larger lumbar artery, access to the second lumbar artery was difficult and it was elected to pack the space between the previous endovascular graft and the second lumbar artery with coils, thereby occluding the origin of the second lumbar vessel. The transvenous approach allowed catheter assessment of the venous pressures within the aneurysm sac and the IVC before and after coiling with marked reduction in the measured venous pressure from a mean of 100 mm Hg down to 37 mm Hg, the measured pressures within the sac and the IVC being equal (Fig 3). The high residual pressure was felt to reflect the known cardiac issues with tricuspid and mitral valve incompetence.

Immediately after the procedure, the patient noticed significant improvement in his breathing, and was able to lie flat without shortness of breath and to walk with no obvious limitation. Over the following weeks, his fluid overload corrected with weight loss of 23 kg and complete resolution of the

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severe bilateral lower limb oedema. He remains asymptomatic at 18 months of follow-up without shortness of breath, orthopnea, or lower limb oedema and has not required any intervention for cardiac valve disease. Follow-up cardiac echocardiography has shown a decrease in the size of the IVC, a decrease in pulmonary pressures, a decrease severity of both mitral and tricuspid incompetence, improved left ventricular ejection fraction, and a decrease size of the cardiac chambers. He has also had a significant decrease in medication requirement for his cardiac failure.
DISCUSSION

A type II endoleak after EVAR for AIA with AVF may be classified into symptomatic and asymptomatic. Symptomatic type II endoleak is one in which detrimental clinical sequelae or AIA sac expansion related to the endoleak occurs. We propose a management algorithm in Fig 4.

In standard infrarenal EVAR, an asymptomatic type II endoleak can be managed conservatively and is often the policy adopted in EVAR for AIA with aortocaval/venous fistula. The largest review of management of aortocaval fistula (ACF) analyzed 67 AIA with ACF comparing endovascular (n = 26) and open repair. Through a subanalysis of these case reports, we identified nine type II endoleaks after endovascular repair, of which eight were asymptomatic. Spontaneous resolution of these asymptomatic endoleaks occurred in 75% of patients (n = 6). Two patients underwent intervention despite their asymptomatic status. Kopp et al described endovascular coiling of an asymptomatic type II endoleak supplied by the inferior mesenteric artery; LaBarbera et al performed transarterial coil embolisation of the aneurysmal sac and used a muscular ventricular septal defect occluder device to close the ACF, requiring concomitant femoral arterial and venous access. Sveinsson et al reported ongoing abdominal aortic aneurysm (AAA) shrinkage over 8 years after EVAR despite a massive ACF and type II endoleak; they postulated a therapeutic role for persistent ACF in the context of type II endoleak.

Overall, it seems to be safe to manage an asymptomatic type II endoleak conservatively, even in the context of persisting ACF after EVAR for AAA.

We identified three cases of symptomatic type II endoleak after EVAR for AIA with AVF. Jeuriëns-van de Ven et al described open repair with good recovery for persistent type II endoleak with an iliocaval AVF after EVAR for bilateral common iliac aneurysms. The patient presented with dyspnea and weight gain, and initial treatment with inferior mesenteric artery embolisation failed to resolve the fistula owing to lumbar collaterals.

Sfyroeras et al described an open management of symptomatic type II endoleak presenting as persistent derangement of renal function after EVAR for AAA with ACF, thought to be due to increased IVC and renal vein pressure from the fistula after 6 months of conservative management. After open surgical ligation of the fistula, the authors reported improved renal function.

Melas et al reported endovascular repair of type II endoleak from a lumbar artery 1 month after emergency EVAR for ruptured AIA, with no evidence of AVF or endoleak at the time of repair. The patient developed signs of heart failure and follow-up imaging at 6 months revealed an AVF and a persistent endoleak. An IVC stent graft (LeMaitre Vascular, Burlington, Mass; Tubular Unifit) was inserted via the femoral vein. Concomitant femoral artery access was used for diagnostic angiography which confirmed resolution of the endoleak intraoperatively. Both the endoleak and the ACF remained closed with decrease in aneurysm sac size and patent IVC at the 36-month follow-up computed tomography scan.

In our case, it was not technically feasible to use a covered IVC stent owing to its proximity to the IVC confluence and a ventricular septal defect occluder device to close the ACF, requiring concomitant femoral arterial and venous access. Sveinsson et al reported ongoing abdominal aortic aneurysm (AAA) shrinkage over 8 years after EVAR despite a massive ACF and type II endoleak; they postulated a therapeutic role for persistent ACF in the context of type II endoleak.

We describe a case of transvenous access for the arterial embolisation of symptomatic type II endoleak after EVAR for AIA with AVF, negating the requirement of arterial puncture and the often-challenging access to the lumbar arteries via an arterial approach. The procedure
was quick, safe, and led to symptomatic improvement. This treatment also allowed IVC pressure assessment during the procedure as a guide to successful treatment. This technique could be considered either as a stand-alone procedure or in conjunction with other endovascular treatments in cases of symptomatic type II endoleak with persistent AVF after EVAR.

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