

## Rupture of an Abdominal Aortic Aneurysm Previously Repaired with an Endovascular Stent-Graft: Successful Management Using an Endovascular Approach

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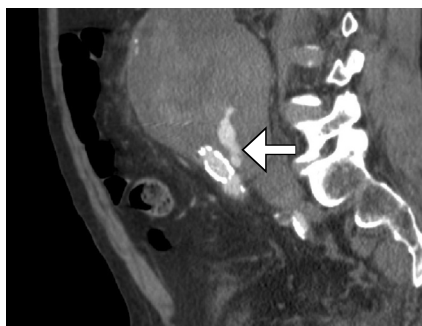
Ruptured abdominal aortic aneurysm following previous deployment of an endoluminal graft is a relatively new vascular emergency. As more patients are treated by endovascular repair, more will present with post-EVAR acute AAA. This new challenging entity is raising the need for new treatment strategies. We describe a case of post-EVAR ruptured AAA that was managed successfully using the endovascular approach.

### Patient Description

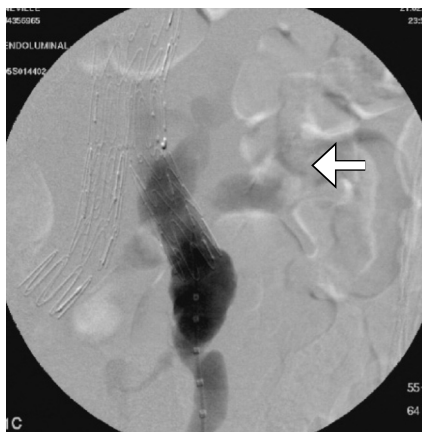
A 79 year old man presented to the emergency department hemodynamically stable with a 4 hour history of severe abdominal and back pain. Six years previously he had undergone elective endovascular abdominal aortic aneurysm repair with a modular bifurcated endoluminal graft. He was lost to follow-up after 2 years, at which point he had no evidence of endoleak.

Urgent computerized tomography angiography revealed a contained rupture of an 11 cm abdominal aortic aneurysm with an extensive retroperitoneal hematoma. A large endoleak was demonstrated and appeared to be related to the distal attachment of the left limb of the stent graft, i.e., a Type Ib endoleak [Figure A]. Plain abdominal films failed to demonstrate any modular disconnection or stent fractures. The patient had significant co-morbidities, including severe cardiomyopathy, ischemic heart disease, chronic obstructive lung disease, and hypertension, making a minimally invasive treatment approach desirable.

In the operating room, under general anesthesia the left femoral artery was exposed and the previous stent graft cannulated with a pigtail catheter. Angiography confirmed a large type Ib endoleak [Figure B]. A 14 x 71 mm Zenith extension limb (W.A. Cook, Brisbane, Australia) was deployed over a stiff wire



**[A]** Sagittal CT image, demonstrating the large endoleak, arising from the junction of the left common iliac artery with the left limb of the previous stent graft (arrow).



**[B]** Intraoperative angiogram with selective cannulation of the left iliac limb demonstrating the endoleak arising from the distal end of the stent graft (arrow).

from inside the stent graft to the proximal external iliac artery, covering the leak and the origin of the internal iliac artery. Completion angiography revealed no endoleaks and a good flow distally. The left internal iliac artery was then ligated via a retroperitoneal approach. Follow-up CT angiography on the third postoperative day confirmed that the endoleak had been sealed successfully. On the fourth postoperative day the patient required a right hemicolectomy, end ileostomy, and tube transverse colostomy due to cecal ischemia secondary to colonic pseudo-obstruction. The following day he developed severe hemorrhagic shock secondary to intraabdominal bleeding from the ileostomy site. Secondary thrombosis of the left graft limb due to a period of prolonged hypotension was managed with a femoro-femoral crossover bypass. Following this his postoperative recovery was uneventful and he was discharged to convalescence.

### Comment

While endovascular repair of ruptured abdominal aortic aneurysm has been well described [1], to our knowledge there are very few reports of successful endovascular management of a ruptured AAA that had previously been repaired using an endovascular stent graft. Ruptured AAA following previous deployment of an endoluminal graft is a relatively new vascular emergency. As more patients are treated by EVAR, more will present with post-EVAR acute AAA [2,3]. This subgroup presents new challenges for the vascular surgeon.

This case emphasises the importance

EVAR = endovascular abdominal aortic aneurysm repair

AAA = abdominal aortic aneurysm

of post-EVAR follow-up. Estimated post-EVAR AAA-related mortality is 0.4% to 1% per year following graft deployment [3,4]. To date, the inability to provide a good quality follow-up program is considered a relative contraindication for EVAR. The optimal long-term follow-up regime is yet to be defined, but serial periodic ultrasound or CT assessment of AAA sac diameter, presence of endoleaks and plain abdominal films to exclude stent graft migration or structural changes are mandatory [1,5]. Data from the EUROSTAR registry suggest that more than 50% of post-EVAR patients are lost to follow-up after 2 years [4]. The mandatory need for post-EVAR life-long follow-up cannot be overemphasized.

The necessity to determine the size of the aneurysm, endoleak site, and size of previous graft means that a preoperative CT angiography is obligatory for patients with post-EVAR ruptured AAA. The patient must be hemodynamically stable enough to withstand the time delays of preoperative imaging and of waiting for the necessary stent graft components, otherwise an open approach may offer the best chance of survival.

While many centers use endovascular stent grafts in the angiographic suite, the urgency, clinical complexity and unpredictability of such cases is such that

we believe management in the operating rooms rather than the X-ray department is preferable in these situations. Obviously, individual institutional policies should be tailored in accordance with the resources available. In addition, the operating room must incorporate specific facilities that will enable stent graft implantation under emergent circumstances.

Deployment of an iliac extension piece is a relatively easy method of managing both modular disconnection and proximal migration of the stent graft iliac limb, as in our case. An alternative approach to manage proximal migration is the deployment of an aorto-uni-iliac device with an iliac occlusion plug in the ipsilateral (leaking) iliac stent graft with a femoro-femoral crossover bypass.

Distal migration of the main stent graft body causing a type Ia endoleak can be dealt with by placement of a new stent graft within the original, covering the source of the proximal leak from below the renal arteries into the original graft. A large-diameter balloon-expandable stent can be used as a temporizing measure to enable stabilization until a more permanent solution is devised.

Endovascular treatment is a feasible method for managing post-EVAR ruptured AAA and should be considered a potential treatment option for such patients.

## References

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