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CASE REPORT

Repeat Rupture of a Giant Abdominal Aortic Aneurysm after EVAR

Jorn P. Meekel [a,b], Theodorus G. van Schaik [a,b], Michiel L.P. van Zeeland [c], Kak K. Yeung [a,b,*], Arjan W.J. Hoksbergen [a]

[a] Department of Vascular Surgery, Amsterdam University Medical Centres, VU University Medical Center, Amsterdam, the Netherlands
[b] Amsterdam Cardiovascular Sciences, Department of Physiology, Amsterdam University Medical Centres, Location VU University Medical Center, Amsterdam, the Netherlands
[c] Department of Vascular Surgery, Ziekenhuis Amstelland, Amstelveen, the Netherlands

Introduction: Ruptured abdominal aortic aneurysms (AAAs) are known to be associated with high fatal outcomes. Giant AAAs are often defined as having a maximum diameter over 13 cm. Large AAAs over 8 cm have demonstrated a yearly rupture rate of 30—50%, which explains the rarity of giant AAAs. Endovascular repair of ruptured AAAs (rAAAs) is increasingly advocated because of the shorter hospital stay and fewer post-operative complications. Nonetheless, outcomes regarding mortality and cost-effectiveness show a large variability and long-term outcomes are lacking. Few data have been published on treatment of giant AAAs and rAAAs; however, open surgery is generally the preferred option.

Report: An 83 year old presented to the Emergency Department with a history of ruptured abdominal aortic aneurysm treated with an aorto-uni-iliac endograft and a femorofemoral crossover bypass. During follow up, this was complicated by a symptomatic type III endoleak, which was treated by endovascular repair. During the current admission, he presented with a re-rupture of his former aneurysm, which now was 18 cm diameter because of a type IA endoleak. Open surgical repair was performed and the post-operative course was without complications.

Discussion: The current case underlines the value of vascular surgeons being able to perform both open and endovascular surgery in rAAA.

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INTRODUCTION

Since the introduction of endovascular aneurysm repair (EVAR), technical improvements have led to the widespread use of EVAR, including for ruptured abdominal aortic aneurysms (AAAs). To date, however, no reliable long-term conclusions for re-intervention and survival can be drawn from the literature concerning EVAR for ruptured AAAs (rAAAs).[1] Although there is no definitive consensus in the literature, giant AAAs are commonly defined as having a maximum diameter over 13 cm. Giant AAAs often present with a short proximal neck length and increased neck angulation, consequently limiting the possibilities for EVAR.[2] Furthermore, severe intraluminal thrombus and rearrangement of the contents in the abdominal cavity are observed. Open repair of giant AAAs is often the only available treatment, but might also be challenging because of morphological considerations and difficulties during aortic clamping.

This report presents a case of rAAA that was primarily treated by EVAR, during follow up underwent endovascular revision because of a type III endoleak, and finally presented with an 18 cm re-ruptured AAA caused by a type I endoleak, which was successfully treated by open repair. The patient consented to case publication.

CASE REPORT

In September 2017, an 83 year old male complaining of severe abdominal pain since the night before was transferred to hospital as an emergency. His medical history included diabetes, hypertension, and EVAR for a 9 cm rAAA (in 2012, Fig. 1) in another hospital. The former rAAA was treated with an aorto-uni-iliac (AUI) endograft (Medtronic, Minneapolis, MN, USA) 36—14 mm × 10.5 cm (at that time preferred over a bifurcated graft) with distal extension using a 16—20 mm × 9.5 cm limb (Medtronic) to the right side, contralateral iliac occluder, and a femorofemoral crossover bypass, as well as proximal extension (Medtronic aortic cuff 36 mm × 4.5 cm) for an intra-operative type 1A endoleak.

* Corresponding author. Amsterdam University Medical Centres, VU University Medical Center, Amsterdam, Department of Surgery and Physiology, Amsterdam Cardiovascular Sciences, De Boelelaan 1118, P.O. Box 7057, 1081 HV, Amsterdam, the Netherlands.

E-mail addresses: k.yeung@vumc.nl; kakkhee.yeung@gmail.com (Kak K. Yeung).

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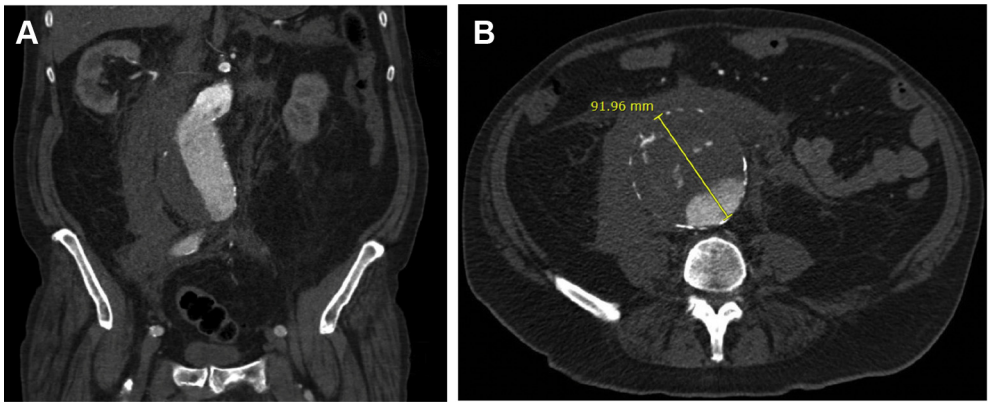

Figure 1. Pre-operative computed tomography angiography of 9 cm ruptured abdominal aortic aneurysm in coronal (A) and axial (B) view.

In 2014, he was readmitted to the Emergency Department complaining of acute abdominal pain as a result of expansion of his AAA to 12 cm caused by a type III endoleak following dislocation of the iliac stent from the main body. This was successfully treated with a 16—20 mm × 9.5 cm iliac stent graft (Medtronic) reconnecting the main body and iliac extension. Close follow up revealed AAA growth of one cm over two years, followed by a stable maximum AAA size of 13 cm. Taking stable size, age, medical history, and patient's preference into account, this medical situation was accepted and no elective surgery was performed.

During his current admission (in 2017), the patient responded adequately, but he had abdominal pain, and he was pale and sweating. Physical examination revealed abdominal distension, diffuse abdominal pressure pain, a blood pressure of 90/73 mmHg, a pulse rate of 68 beats per minute, a saturation of 100% (while receiving 5 L of oxygen through a non-rebreather mask). Femoral pulse were present bilaterally. Laboratory tests (including normal ranges) showed a haemoglobin level of 3.3 (8.5—11.0) mmol/L, haematocrit level of 0.16 (0.40—0.50) L/L, thrombocyte level of 29 × 10^9 (150—400 × 10^9)/L, International Normalised Ratio of 1.45 (0.80—1.20), and serum creatinine of 140 (64—104) µmol/L. A contrast enhanced CT scan showed a ruptured AAA with a large retroperitoneal haematoma and a type 1A endoleak. The maximum AAA diameter was 18 cm, having been 13 cm one year before (Fig. 2 and Video S1).

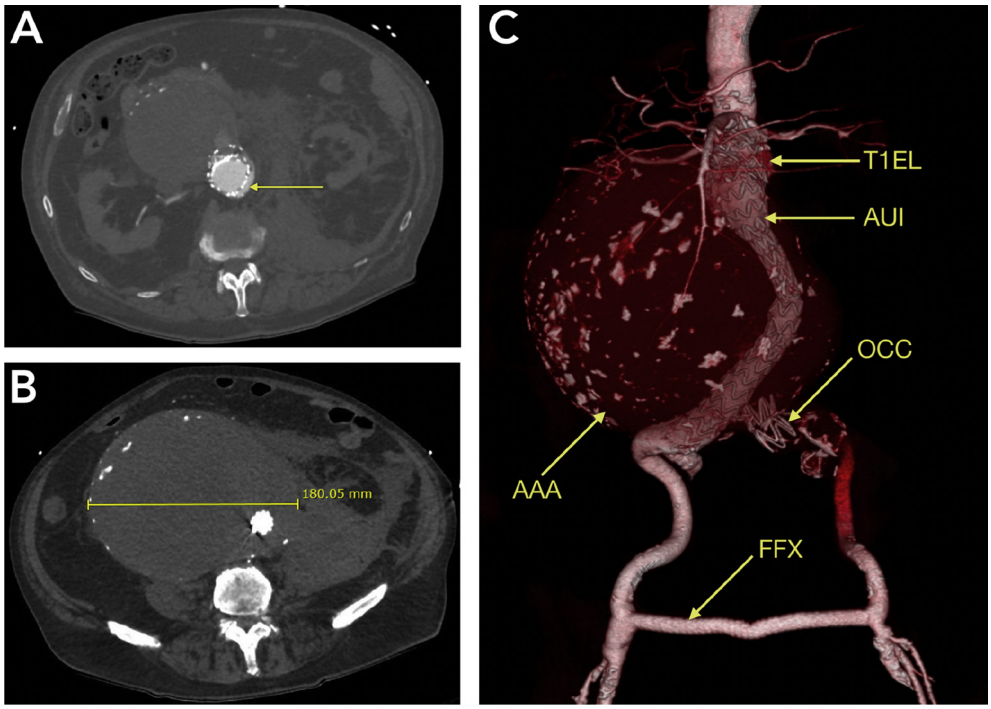

Figure 2. Pre-operative computed tomography angiography of re-ruptured AAA. Type IA endoleak following endovascular aorto-uni-iliac endovascular aneurysm repair is clearly present (yellow arrow) (A). Maximum AAA diameter was 18 cm and retroperitoneal haematoma was observed (B). (C)A three dimensional reconstruction of the pre-operative computed tomography angiogram. AAA = abdominal aortic aneurysm; T1EL = type IA endoleak; AUI = aorto-uni-iliac endograft; OCC = iliac occluder; FFX = femorofemoral crossover bypass.

Supplementary video related to this article can be found at https://doi.org/10.1016/j.ejvssr.2018.12.001

Open surgical repair was performed. After opening the retroperitoneum, an infrarenal clamp was placed on the aortic neck with the stent graft in situ. The aneurysm was opened, and after thrombus removal a clamp was placed on the iliac part of the AUI endograft. An additional clamp was placed on the right iliac artery distal to the stent graft. Thereafter, the endograft was cut at the most distal part of the bare metal and the stent grafts were removed, leaving the bare stent of the proximal stent graft in situ. Next, a conventional knitted polyester aortic bifurcation prosthesis (Uni-Graft® K DV, 20-10 mm, B. Braun, Melsungen, Germany) was inserted of which the left leg was cut and closed using sutures, creating an AUI prosthesis. The pre-existing plug occluded left common iliac artery was left untreated and the aneurysm was closed around the prosthesis. The sigmoid colon was seen to be viable and femoral pulsations were present bilaterally. The post-operative period was uncomplicated; the patient was transferred from the ICU to the ward after one day and was discharged home without complaints seven days later. Follow up duplex ultrasound after six months showed no complications.

DISCUSSION

Serious post-operative complications of EVAR include device migration, separation of components, limb kinking, and infection, which might lead to endoleaks and potentially expansion of the aneurysm and rupture. Therefore, type I and III endoleaks require prompt repair.[3] Potential treatment options for type 1A endoleaks include proximal balloon angioplasty, balloon expandable stents, covered extension cuffs with or without fenestrations or chimney grafts, EndoAnchors, embolisation using coils or liquid embolics, and open repair.[3] In this case, open repair was favoured based on the following considerations: (i) aneurysm rupture makes treatment using balloon angioplasty alone, EndoAnchors, or embolisation insufficient; (ii) the close position of the pre-existing proximal cuff with respect to the renal arteries creates the inevitable need for at least two chimney grafts when proximally extending the AUI endograft, leading to suboptimal outcomes; (iii) previous endovascular (re)interventions and access through only one extensively calcified femoral artery, because of the plugged left common iliac artery; (iv) large aneurysm size; and (v) relatively favourable comorbidity to undergo open surgery.

A recent overview indicated non-inferiority of EVAR and advised a patient specific treatment decision for rAAAs.[4] For giant rAAAs, this generally leads to the decision for open repair, since proximal neck shortening and increased angulation of the neck often occur.[2] Nonetheless, EVAR can be considered sometimes as a treatment option if open repair is precluded by patient comorbidity.[5]

This case report highlights the importance for vascular surgeons to retain competence in both open and endovascular surgery in case of (re-)ruptured AAAs. Hence, for a (re-)ruptured AAAs, patient specific judgment should be based on aortic morphology, patient comorbidity, compliance with therapy and follow up, availability of endografts, and the surgeon's experience. The third option, no surgical treatment, could perhaps be made with the help of a mortality prediction model based on clinical parameters. However, this model needs further validation.[6] In giant (ruptured) AAAs, open repair is frequently the only feasible treatment option, However, as a consequence of morphological presentation and difficulties during aortic clamping, open repair also carries serious challenges. If, after careful consideration, EVAR is still preferred, post-operative lifelong monitoring is advised not only to detect early, but (very) late complications as well.

CONFLICTS OF INTEREST

None.

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