

Bilateral Type IIIa Endoleak and Disconnection of Both Limbs after Evar with an Endurant II Endograft

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A 75-year-old patient with severe comorbidities was treated with an Endurant® (Medtronic, USA) II endograft due to a ruptured abdominal aortic aneurysm (AAA). After four years of unremarkable follow-up, bilateral limb separation was detected. The patient underwent endovascular bridging without any complication. Although rarely detected in newer grafts, late bilateral type IIIa endoleaks can present and should be promptly repaired. Complex or ruptured AAAs treated with off-label use of endografts should be under closer surveillance using imaging tools for potential endoleaks or aneurysm sac growth.

Key Words: Endovascular procedures, Abdominal aortic aneurysm, Endoleak, Retreatment

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INTRODUCTION

Endovascular abdominal aortic aneurysm repair (EVAR) has been proved to be a minimally invasive and safe alternative to open surgery [1]. Research data show that although perioperative mortality and morbidity are significantly lower with EVAR, longterm survival is similar between the two methods in selective cases and hence, rates of graft-related complications and reinterventions are higher in patients treated endovascularly [1]. Endoleaks are major complications that occur in 20%-25% of EVAR patients [2]. Accurate detection and classification of endoleaks is essential for the proper management since the method of treatment is determined by the different source.

There are five different types of endoleak. Type III endoleaks are usually caused by a defect within the graft material (IIIb) or are due to structural failures causing separation between the components or inadequate overlap (IIIa). In general, high-pressure leaks (such as type I and

type III) require urgent management because of the relatively high short-term risk of sac rupture [2]. Nowadays, type III endoleaks are infrequently encountered because of the new-generation nitinol stent grafts, longer overlap zones between the modular components and stronger polyester fabrics even though the devices do not have any special fixation technologies other than overlapping itself. Therefore, the aim of this report is to present a rare case of bilateral type IIIa endoleak due to disconnection and separation of limbs in a new-generation endograft (meaning 2nd or 3rd generation of a device), and to make useful conclusions regarding proper management of such patients.

Approval from the patient himself has been obtained prior to the submission of this manuscript, according to the Helsinki Declaration.

CASE

A 75-year-old male patient suffering from arterial

hypertension and severe chronic pulmonary disease was transferred to our department from a peripheral hospital diagnosed with a contained abdominal aortic aneurysm (AAA) rupture. The patient had presented with a sudden abdominal pain during the last five hours. His medical history did not reveal any other comorbidities or other past surgical procedures. Additionally, the patient reported that he was a smoker and that he received antihypertensive and bronchodilation treatment.

Regarding his status, the patient was transferred in a hemodynamically stable condition. As shown in Fig. 1, the

computed tomography (CT) imaging revealed an infrarenal AAA with maximum transverse diameter of 12.5 cm and neck length of almost 2 cm showing a contained rupture. Although the preoperative imaging revealed a high angulation of the aneurysmal neck (aortic neck angle 80°), given his comorbidities (forbidding general anesthesia) and the rupture, the patient underwent an urgent endovascular AAA repair (EVAR; Endurant® II, Medtronic®; Medtronic, Minneapolis, MN, USA) using a bifurcated endograft (main body: proximal diameter, 36 mm; distal diameter, 16 mm; length, 145 mm; left limb: proximal diameter, 16 mm; distal

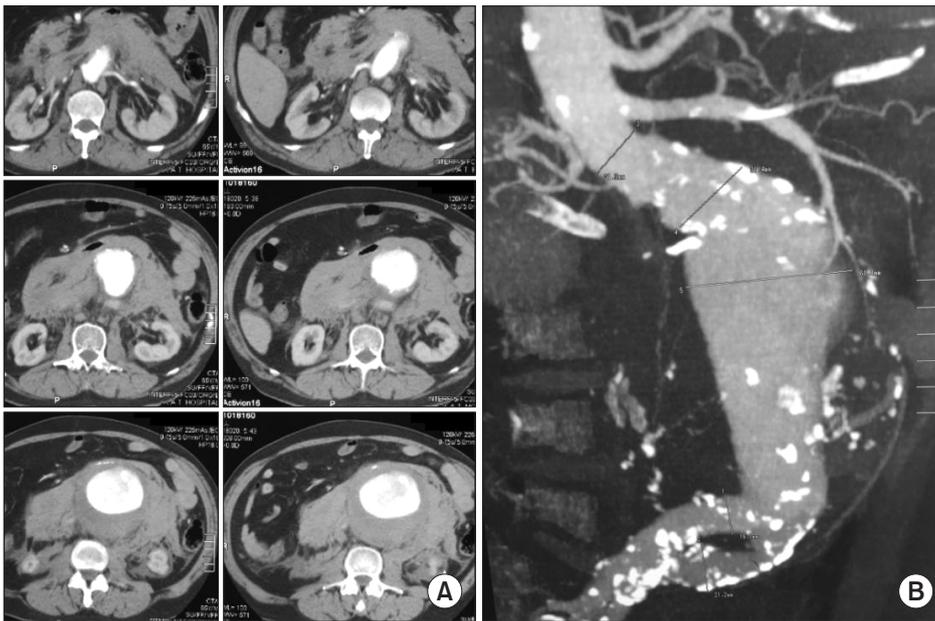


Fig. 1. Computed tomography angiography showing the original contained rupture of a large sized abdominal aortic aneurysm (12.5 cm in diameter). (A) Transverse images, (B) sagittal image.

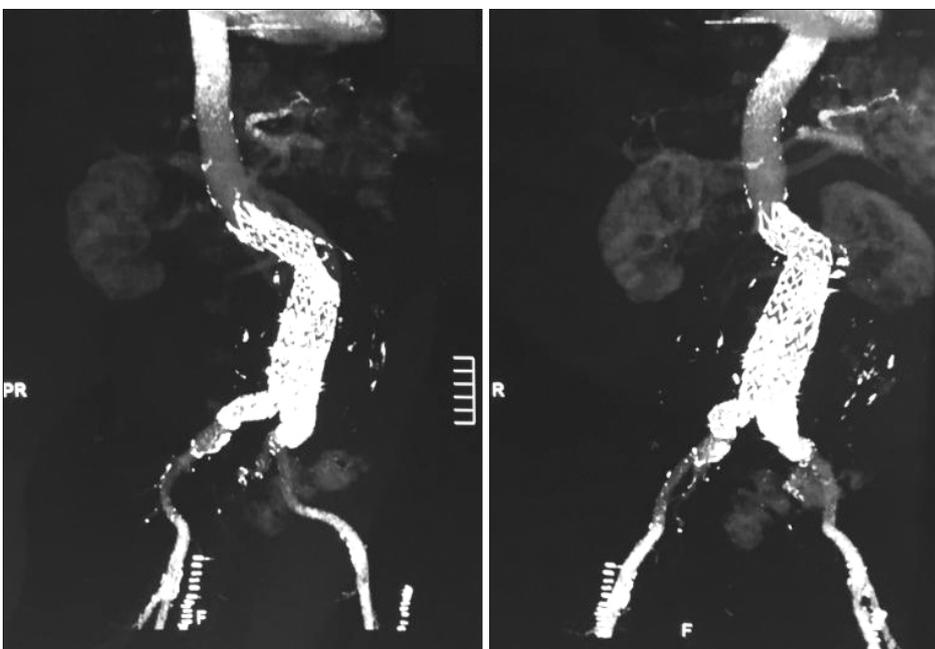


Fig. 2. Computed tomography angiography showing the implanted endograft one year after the procedure. No endoleak or disconnection is observed.

diameter, 24 mm; length, 124 mm) and overall three limb extensions (one on the right side: proximal diameter, 16 mm; distal diameter, 24 mm; length, 124 mm and two on the left side: proximal and distal diameter, 24 mm; length, 82 mm). Intraoperative sealing both proximally and distally as well as overlapping of extensions (covering the preset markers of the graft and the extensions) was adequate on the right side (3 stents covered) and marginal on the left side (2 stents covered). Postoperative course of the patient was optimal, without any major adverse event, and he was discharged under proper treatment on the 7th postoperative day after being evaluated with a postoperative CT imaging study.

During follow-up, the patient underwent CT evaluation after one month that did not show any endoleak or other

complication. According to European Guidelines [1], he underwent a second CT examination after one year that showed a satisfying position of the graft without any obvious endoleak as well (Fig. 2). Afterwards, follow-up included yearly ultrasound examinations and plain abdominal x-ray imaging. During follow-up, the aneurysmal sac showed gradual decrease in size and no endoleak was observed. After four years from the initial procedure, the patient's plain abdominal imaging showed a major kinking and detachment of limb extensions bilaterally (Fig. 3A). The patient did not report any symptoms during the entire evaluation period.

As a result, a new CT examination followed, showing bilateral separation of a limb extension of the endograft causing a type IIIa endoleak bilaterally (Fig. 3B). An

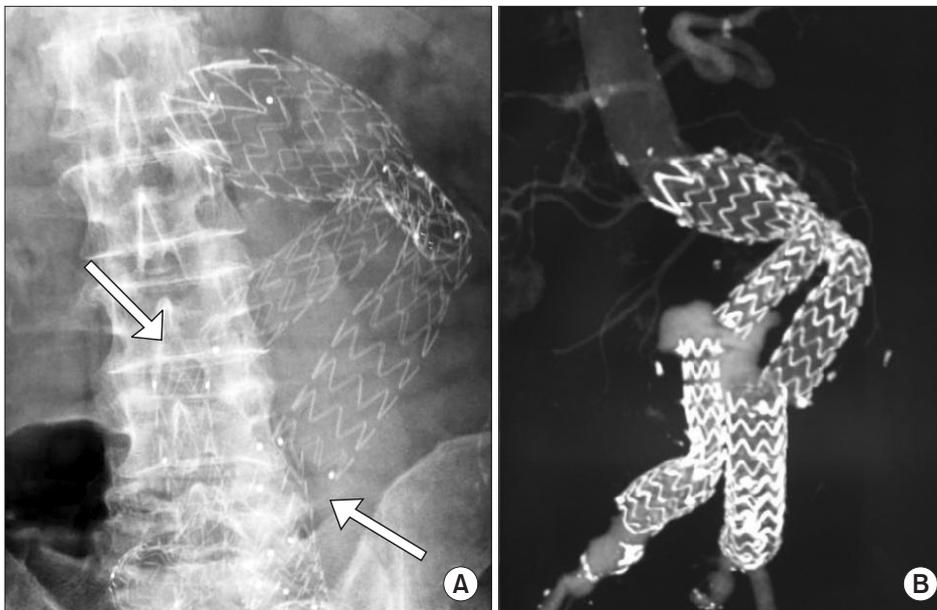


Fig. 3. (A) Plain radiography image of the endograft showing a bilateral disconnection and separation of limbs, four years after the original procedure (arrows). (B) Computed tomography angiography image showing the bilateral type IIIa endoleak.



Fig. 4. Intraoperative digital angiography (A) and postoperative plain radiography (B) images showing the successful bridging of the endoleaks.

endovascular repair was scheduled and two limb extensions were placed in order to bridge the gaps on both sides (Medtronic®, right extension: proximal and distal diameter, 16 mm; length, 124 mm; left extension: proximal and distal diameter, 28 mm; length, 82 mm). Final intraoperative digital angiography as well as re-evaluation with plain x-rays on the 3rd day showed an optimal result (Fig. 4). Postoperative course was unremarkable as well. Follow-up after one year with CT evaluation shows the bridged limbs without any notion for endoleak.

DISCUSSION

This is a rare case of bilateral limb separation that was detected four years post the original procedure and that was correctly managed with endovascular technique.

Type III endoleaks are not very common, especially with endografts of newer generation. Our patient presented an endoleak only four years post original repair, concurring with a large series where a very small incidence of type III endoleaks was observed within four years of follow-up [3]. However, there are cases where this type of endoleak has caused rupture of the aneurysmal sac in the late setting, and therefore careful monitoring and prompt treatment of such patients is imperative [4]. Although most cases reporting type III endoleak refer to older editions of stent-grafts and all of them being unilateral, there have been some reports of type IIIb endoleak with the Endurant® stent graft recently [5]. The only case of bilateral type IIIa endoleak has been reported by Matsasgkas although this was the case of an older generation graft as well [6]. However, our patient had undergone EVAR using an Endurant® II stent-graft due to rupture of a large-sized AAA with significant neck angulation. Predicting factors for type III endoleak have not been extensively evaluated in the literature although there are data indicating that the large size or the rupture of the original aneurysm—as in our case—could play a role [1,7]. Furthermore, the angulation of the neck was not prohibitive for endovascular repair although it seems to have played a role on the occurrence of endoleak. Additionally, the overlapping of limbs on the left side was marginal, probably predisposing for an endoleak. Therefore, such patients undergoing emergency EVAR for ruptured AAAs with significant angulation or suboptimal overlapping should be under closer observation during follow-up.

Concerning the type of the deployed graft, the Endurant® II stent-graft is one of the new-generation grafts. Treatment with this type of graft is technically feasible and safe, yielding late durability and satisfactory results even in challenging anatomies or rupture, according to the literature [7]. Donas et al. [7] have concluded

that its performance during a period of 7 years under real-life conditions was satisfying, with low incidence of reinterventions and endoleaks (no endoleak type III reported). Recently, a worldwide multicenter study including over 1,200 patients has been initiated in order to augment the knowledge base in real-world population treated with Endurant® grafts, although 5-year follow-up data will be revealed in 2018 [8]. Skibba et al. [9] have evaluated Endologix Powerlink® and AFX® (Endologix, Irvine, CA, USA) endografts in 701 patients and treated type IIIa endoleaks in 2.4% of patients, which was more than 50% of the total number of endoleaks treated in that series. Therefore, it is recommended that patients treated under the old instructions for use (that is before 2013) should be evaluated for signs of impending component separation and monitored annually [9]. However, one should underline that this case was treated as an emergency, the aneurysm's anatomy was hostile and the overlapping was not the optimal at least on one side.

Finally, regarding the proper modality for evaluating EVAR patients during follow-up, results are controversial in the literature. The latest guidelines recommend postoperative surveillance to include a CT angiography (CTA) and plain radiography within 1 month [1]. If an endoleak is detected that does not necessitate immediate treatment, CTA and plain radiography are advised after 6 and 12 months and yearly thereafter. If no endoleak is detected at 1 month, CTA is advised after 12 months followed by yearly abdominal duplex ultrasound (DUS) and plain radiography [1]. Perhaps, the former more strenuous follow-up protocol (CTA at 6, 12, 14, 36, 48 months) could be applied in cases with major risk factors for future endoleak/migration such as in this case. However, recent data indicate that an intraoperative completion angiogram, DUS, and abdominal radiography show a high sensitivity and negative prognostic value for the detection of endoleaks and should detect early migration or kinking of the stent-graft [10]. Complex or ruptured AAAs treated with off-label use of endografts—such as in our case—should be under closer surveillance using the indicated imaging tools for potential endoleaks or aneurysm sac growth.

In conclusion, bilateral type IIIa endoleaks are rare in newer generation endografts although they should be promptly treated when detected. Patients treated for ruptured AAAs with challenging anatomies seem to be of higher risk and they should be under closer monitoring and observation during follow-up. Follow-up should utilize all recommended modalities, with CTA also recommended for those with inconclusive ultrasound images or late signs of endoleak/failure.

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