

Late type IIIb endoleak after endovascular aneurysm repair: case report and review of the literature

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SUMMARY: Late type IIIb endoleak after endovascular aneurysm repair: case report and review of the literature.

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Purpose. To report a case of type IIIb endoleak developed six years after endovascular abdominal aortic aneurysm repair (EVAR).

Case report. A 75-year-old man underwent successful Talent™ stent-graft positioning to treat a 53 mm abdominal aortic aneurysm. Subsequently the patient did well and yearly routine control computerized tomography (CT) was unremarkable. Six years later the patient suddenly developed abdominal pain irradiating to the back. An emergency angio-CT showed the presence of a type IIIb endoleak arising from the main body of the endograft. There weren't signs of fissuration or rupture. Aneurysm diameter was 85 mm as compared to 52 mm on a CT performed ten months earlier. The patient underwent successful positioning of an aorto-monoiliac endograft followed by the occlusion of the contralateral limb and a femoro-femoral crossover dacron bypass graft. Three months later the patient presented again because of the sudden onset of abdominal pain. On angio-CT aneurysm size was increased up to 11 cm. A distal type I endoleak was found and treated by placing an iliac extension to the right external iliac artery. After uneventful postoperative course the patient was discharged in good general conditions. Control angio-CT done after six months showed the complete exclusion of the large aneurysm sac.

Conclusions. Type IIIb endoleaks can be safely treated by endovascular positioning of an aorto-monoiliac stent-graft followed by the occlusion of the contralateral limb and a femoro-femoral crossover dacron bypass graft. Continuous surveillance after EVAR is mandatory.

RIASSUNTO: Endoleak tipo IIIb dopo riparazione endovascolare di aneurisma dell'aorta addominale (EVAR). Caso clinico e revisione della letteratura.

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Introduzione. Presentiamo il caso di un paziente di 73 anni affetto da endoleak (EL) di tipo IIIb comparso 6 anni dopo riparazione endovascolare di aneurisma dell'aorta addominale (EVAR).

Discussione. Il paziente era stato sottoposto con successo 6 anni prima a posizionamento di endoprotesi Talent™ per un aneurisma dell'aorta addominale (AAA) di 53 mm. I controlli TC di routine erano negativi. Sei anni dopo, in seguito a forti dolori addominali che si irradiavano posteriormente, il paziente è stato sottoposto ad un angio-TC d'urgenza che ha messo in evidenza un EL di tipo IIIb a partenza del corpo protesico e un diametro aneurismatico di 85 mm. Non erano presenti segni di fissurazione o di rottura. Il paziente è stato pertanto sottoposto a posizionamento di endoprotesi aorto-monoiliaca con occlusione dell'arto controlaterale e bypass femoro-femorale in dacron. Tre mesi dopo il paziente si ricovera nuovamente presso il nostro Dipartimento per dolore addominale improvviso. Un'ulteriore angio-TC mostrava un ingrandimento dell'AAA di 11 mm e la presenza di un EL di tipo I immediatamente trattato con una protesi Talent™ estesa fino all'arteria iliaca esterna di destra. Il decorso post-operatorio è stato regolare e il paziente veniva dimesso in buone condizioni generali. Il controllo TC a sei mesi mostrava la completa esclusione del sacco aneurismatico.

Conclusioni. Gli EL di tipo IIIb in pazienti ad alto rischio possono essere trattati in modo efficace con il posizionamento di protesi aorto-monoiliache associate ad occlusione dell'arto controlaterale e bypass femoro-femorale. L'esecuzione di angio-TC di routine dopo interventi di EVAR è mandataria.

KEY WORDS: Abdominal aortic aneurysm - Endovascular treatment - Type III endoleak.
Aneurisma dell'aorta addominale - Trattamento endovascolare - Endoleak di tipo III.

Introduction

Conventional open surgery has been for decades the gold standard for treatment of abdominal aortic aneurysm (AAA). With the introduction of endovascular aneurysm repair (EVAR) by Juan Carlos Parodi in 1991 (1) earlier opinions about this less invasive technique were enthusiastic. However, despite early-term results compare fa-

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vorably to the endoluminal treatment, long-term clinical studies have shown a high incidence of late complications and of surgical and endovascular revisions (2-4). Thus, continuous surveillance after EVAR is mandatory. These factors represent important costs also in term of patient's quality of life rather than just financial for the society.

We describe the case of a patient affected by an AAA who underwent positioning of a Talent™ bifurcated endograft. Six years later he developed a type IIIb endoleak arising from the main body of the fabric and subsequently a distal type I endoleak, both successfully treated by combined open and endovascular procedures.

Case report

A 75-year-old man underwent successful stent-graft positioning with a Talent AAA (Medtronic AVE, Santa Rosa, Ca, USA) endograft system to treat a 53 mm abdominal aortic aneurysm in October 2000. The patient did well and yearly routine control computerized tomography (CT) was unremarkable.

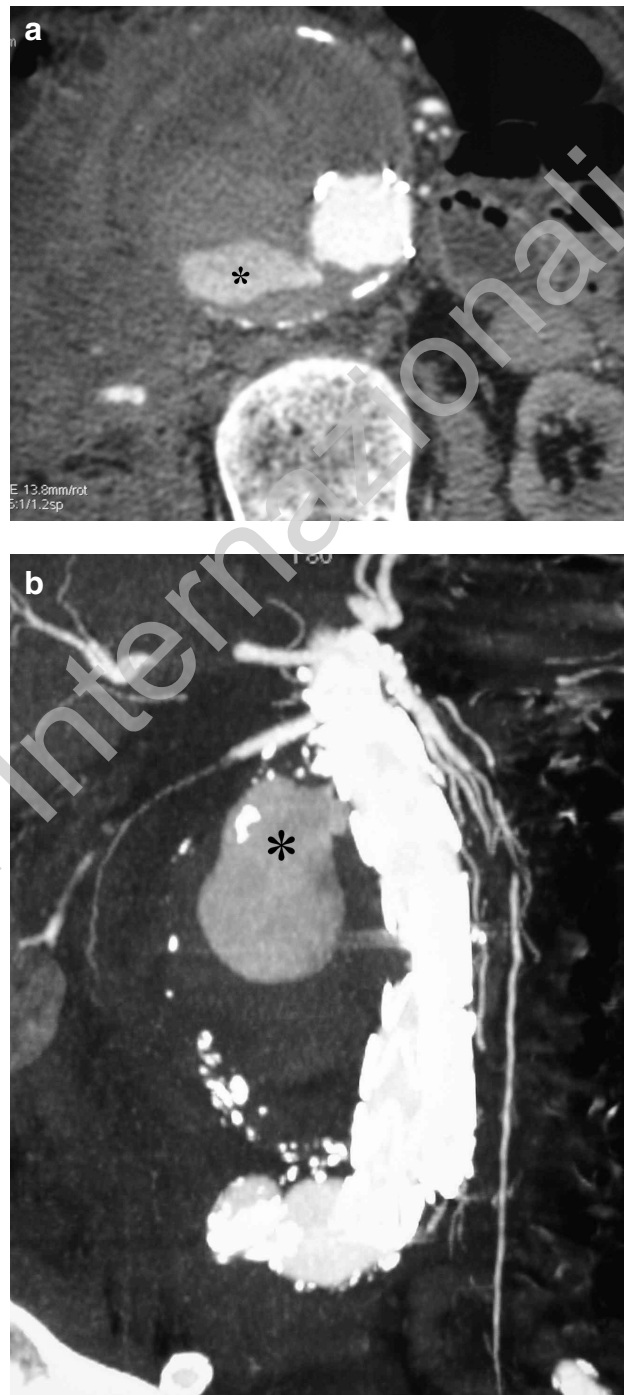
Six years later the patient suddenly developed abdominal pain radiating to the back. On arrival to the hospital he was haemodynamically stable. Emergency angio-CT (Figs. 1a, b) showed the presence of a type IIIb endoleak (EL) arising from the main body of the endograft. Apparently there weren't signs of fissuration or rupture of the aneurysm. The maximum transverse diameter of the aneurysm increased from 52 mm on the CT done ten months earlier to 85 mm. A high-risk was anticipated in consideration of advanced age, respiratory insufficiency and coronary artery disease (ASA, American Society of Anesthesiologists Classification III-IV). Antihypertensive therapy with beta-blockers was started soon after the admission.

In the operating theatre both groins were opened. An intraoperative angiography clearly visualized the type IIIb endoleak. After full heparinization the patient underwent successful positioning of a Talent™ AAA aorto-monoiliac endograft system associated to the contralateral limb occlusion and to a right-to-left femorofemoral crossover dacron bypass (Vascutek LTD., Inchinnan, Scotland). The postoperative course was uneventful.

Three months later the patient presented again to the emergency department with the sudden onset of abdominal pain. Angio-CT and pre-operative arteriography documented an increase of aneurysm size up to 11 cm and the presence of a type I EL (Figs. 2 and 3) that was immediately treated by placing a Talent™ AAA (Medtronic, Santa Rosa, California) iliac extension to the right external iliac artery (Figs. 4 a,b). After six months the patient was doing well and a control CT confirmed the complete exclusion of the aneurysm and the absence of endoleaks (Fig. 5).

Discussion

Complications related to EVAR are quite frequent and include endoleak, migration, kinking, thrombosis, aneurysm rupture and death (5). However this high incidence of late complications after EVAR can be also based on the results obtained by studies including first generation grafts (6, 7). The last generation Talent™ AAA endograft system is a self expanding modular system composed of a serpentine-shaped nitinol stent inlaid in a wo-



Figs. 1 a and b - Pre-operative angio CT-scan show a type IIIb endoleak arising from the main body of the endograft (*). Apparently there aren't signs of fissuration or rupture of the aneurysm.

ven polyester fabric. The stents are spaced along a full-length nitinol spine. The latter provides column strength to a graft that is otherwise flexible to accommodate aortoiliac angulations. A 15-mm-long uncovered stent at the proximal end allows transrenal or suprarenal fixation. The

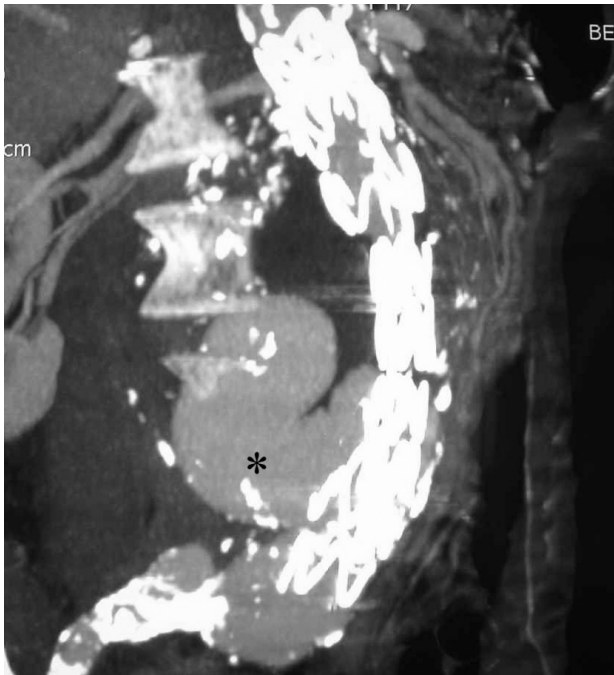


Fig. 2 - Angio-CT done three months later. Presence of a distal type I endoleak (*); the aneurysm size increased.



Figs. 4 a and b - Intraoperative arteriography shows the distal type I EL arising from the aorto-monoiliac endograft (4a) successfully treated by positioning of an iliac extension to the right external iliac artery (4b).



Fig. 3 - Digital subtraction arteriography confirms a distal type I endoleak (*).

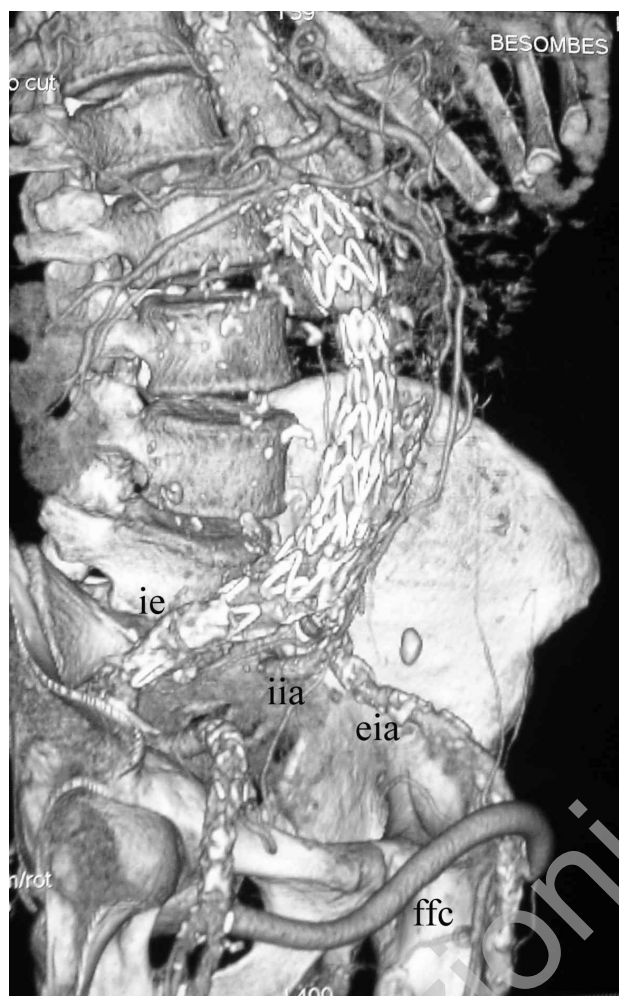


Fig. 5 - Control angio-CT with 3D reconstructions done six months later shows the correct positioning of the aortomoniliac Talent™ endograft deployed inside the previously inserted aorto-biliac endoprosthesis and the iliac extension (ie) down to the right external iliac artery. No further endoleak is evident. The controlateral limb was occluded with a Medtronic's occluder. A right-to-left femoro-femoral crossover bypass graft (ffc) was fashioned in order to perfuse the left common femoral artery and the left internal iliac artery (iia) retrogradely by the left external iliac artery (eia).

particular design of the nitinol stent is supposed to minimize metal fatigue of the nitinol stent and the erosion of the woven fabric.

A recent multicenter retrospective study demonstrated the presence of stent fractures in 4 of the 165 patients (2,42% with a mean follow up of 53 months) treated with a Talent™ endograft. Interestingly no type III EL were detected (8). A radiographic study of Jacobs et al. reported that damage or fracture of the metal skeleton of the endoprosthesis occurred in about 15% of cases after 30 months of follow up (9). However the presence of a fracture in the metallic frame, well visibile on plain radiographs, doesn't mean that the fabric is ruptured as well.

According to reported standards an EL is defined as the persistent perfusion of the aneurysm sac after the en-

dograft positioning. The classification of the endoleaks depends on their origin and aetiology. Type I EL occurs on the endograft's sites of attachment and can be either proximal or distal. Type II is dependent on the retrograde flow from the collateral vessels (i.e. lumbar arteries, inferior mesenteric artery). Type III EL is due either to disconnection of the components of the graft (type III a), or to the fabric erosion (type III b). Type III b can be *minor* (< 2 mm) or *major* (≥ 2 mm). Type IV consists in the presence of blood flow through an intact fabric, and seems to be dependent on the graft porosity. Type V EL, also called endotension, represents the increase in aneurysm sac size with no demonstrable endoleak (10). The overall incidence of EL after EVAR is high, ranging from 17% to 36% (11-13) and seems to be device-specific (12). Type II EL represents the most common type ranging from 60% to 80% of all EL (5, 12) and its treatment is usually conservative. However aneurysm rupture due to a type II EL after EVAR has been documented (14) and these patients need to be periodically surveilled and eventually treated whenever the leak doesn't seal spontaneously within 60 days (15). Reportedly graft-related endoleaks (type I, type III, or a combination) are associated with a significantly greater risk of aneurysm enlargement, rupture and conversion to open repair than collateral perfusion (type II) endoleaks (5, 11, 16). Infact type I and III EL are expression of a direct communication between the aortic circulation and the aneurysm. Because of the systemic repressurization of the sac these EL must be promptly corrected (11, 15). Harris et al. calculated a relative risk of 8.95 for late rupture in case of type III EL (11).

The overall incidence of type III EL is much lower ranging from 0.76% to 7% (6, 12, 17). In a recent EUROSTAR report of 2846 patients treated from december 1999 to december 2004 the overall incidence of type III EL was 3.55% (5). Type III a, the disconnection of the modular limb of the stent-graft, is more common than type IIIb. Considering type IIIb EL we should distinguish proximal from distal leaks, the former located on the main body of the endoprosthesis, and the latter arising from its modular limb. Distal type IIIb EL as well as type IIIa leaks, can be easily repaired with bridging cuffs or iliac extenders (18). However proximal type IIIb leaks are better treated by positioning another stent-graft inside the previous endograft (15, 19, 20). This will allow to cover the hole in the fabric, as done in our patient where the leak was arising from the main body of the Talent™ stent-graft. To minimize friction forces between different materials, whenever possible the same endograft should be used. In this high-risk patient and according to other Authors (15, 19, 20) we positioned an aorto-monoiliac device followed by controlateral limb occlusion and femorofemoral crossover bypass. The outcomes following this treatment are reportedly comparable to those after bifurcated grafts (21).

Conclusion

In case of a type IIIb endoleaks developed in high-risk patients, and in order to avoid open surgery, we recommend to perform an aorto-monoiliac endograft po-

sitioning using possibly the same endograft, associated with contralateral limb occlusion and femoro-femoral crossover bypass graft.

Continuous surveillance with routinely angio-CT after EVAR is mandatory.

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