Lessons learned from a case of complicated type II endoleak: when endograft explantation is the only solution

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Abstract:

We report the case of a 69-year-old man with a computed tomography angiography (CTA) scan showing an abdominal aortic aneurysm with a bifurcated endograft and a type II endoleak. Our first strategy was the embolization of the inferior mesenteric artery with coils, via superior mesenteric artery and marginal colic artery; then we made another endovascular attempt to reach the T2EL with the transarterial technique but without success. After a multisciplinary consultation, we decided to resort to open conversion. Sacotomy revealed that the aneurysm was being supplied posteriorly, from the infrarenal sealing zone of the endograft (unknown type IA endoleak). Thus, we removed the stent-graft and performed an aorto-bifemoral bypass surgery. From this case we learned two lessons: all possible causes of relapsing and complicated type II endoleak should be investigated (also with CEUS or MRI), and open repair surgery (including endograft explantation) should not be considered only as a last resort in patients fit for surgery.

Keywords: Type II endoleak, open conversion; sac growth, embolization, EVAR.

INTRODUCTION

With the introduction of the endovascular aortic repair (EVAR) procedure, the treatment of abdominal aortic aneurysm has deeply changed in the last 30 years[1]. However, EVAR has recently been shown to be associated with higher rates of long-term complications and need for reintervention[2]. Most of these reinterventions are due to endoleaks (EL) which occur in up to 20% of all EVAR procedures[3]. The type II endoleak (T2EL) represents one of the most common complications. In this case report, we describe all the techniques that we applied in our center to treat a complicated T2EL.

CASE REPORT

We report the case of a 69-year-old man with a history of hypertension and EVAR, performed in another Hospital two years before with a bifurcated Excluder abdominal aortic endoprosthesis (GW.L. Gore & Associates, Flagstaff, Ariz) for an abdominal aortic aneurysm. Computed tomography angiography showed an increased aneurysm sac diameter, from 48 mm at the last CTA in 2019 to 54 mm, and a suspected T2EL from the inferior mesenteric artery (IMA) . Our first strategy was the embolization of the IMA : with a 6 F Simmond catheter, through a left femoral access, we reached the superior mesenteric artery ostium and, on a 0.014" hydrophilic guidewire (Avigo, Medtronic Inc, Swinnea), via the superior mesenteric artery, the middle colic and the marginal artery of the colon (of Drummonds), using a pre-shaped microcatheter (145-5091-150 Echelon 10) we embolized the first segment of the IMA with coils (Axium coils, diameters from 8 to 3.5 mm) (fig.1). We decided to limit our intervention to IMA embolization. Three months after, the CTA showed that the IMA was successfully embolized, but it also showed a slight increase of the aneurysmal left iliac-aortic sac (59 mm diameter), with an increasing lumbar arteries (LA) type II endoleak. Thus, we decided to use a second endovascular approach: from a right femoral access, via transiliac paraendograft[4] we attempted to make the endoleak embolization, but without success because of the complete adhesion of the limb to the iliac wall. In addition, we tried to embolize the culprit LA through the catheterization of the internal iliac and iliolumbar arteries, but the anastomosis webs were too small to be navigated. After three months we found an evident posterior type II endoleak (66mm x 60 mm new sac diameter). Together with the general surgeon and the interventional radiologist, we decided to convert to open repair through midline laparotomy, surgical ligation of extra-aneurysmal backbleeders, sacotomy via a longitudinal aortotomy, endoaneurysmorrhaphy, and stent-graft preservation. After sacotomy, we discovered that the aneurysm sac was being supplied posteriorly, from the infrarenal sealing zone of the endograft. Proximal and distal control was obtained by cross-clamping the aorta and the iliac arteries.

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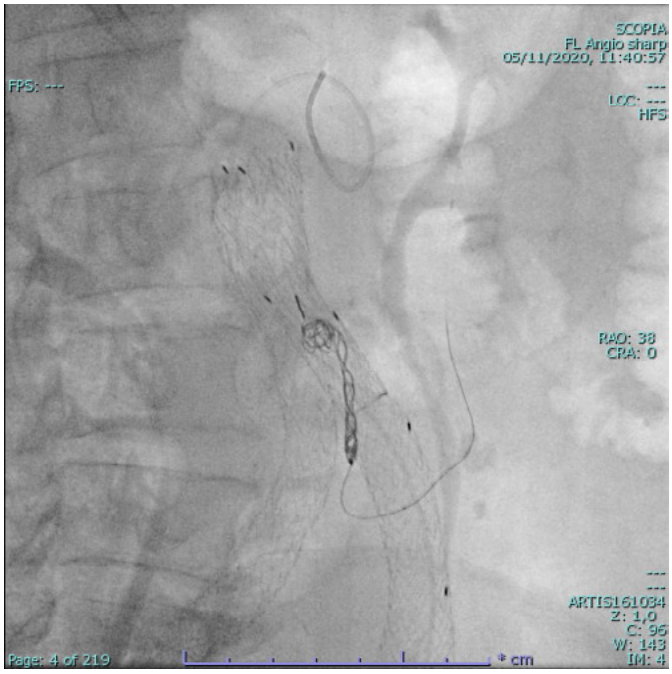

Fig.1: Embolization of the superior mesenteric artery with coils (Axium coils, diameters from 8 to 3.5 mm): on a 0.014" hydrophilic guidewire (Avigo, Medtronic Inc, Swinnea), via the superior mesenteric artery, the middle colic and the marginal artery of the colon (of Drummonds), using a pre-shaped microcatheter (Echelon 10).

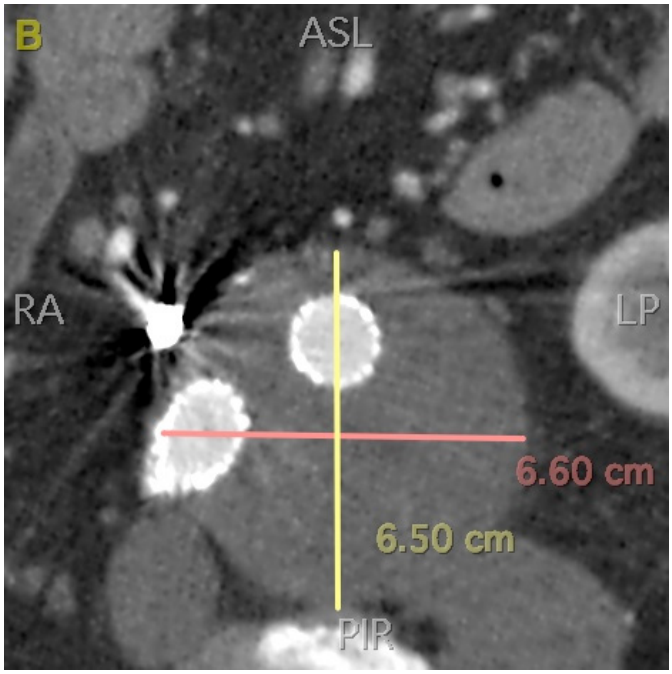

Fig.2: During sacotomy, previously unknown posterior blood flow from the infrarenal sealing zone of the endograft required the endoprosthesis explantation.

Finally, we removed the stent-graft (fig.2) and performed an aorto-bifemoral bypass procedure. Then the patient was sent to the Intensive Care Unit for 72 hours and discharged at the 8th post-operative day with the single anti-aggregation therapy. The 1-month-follow-up CTA showed that the endoleak had been successfully corrected by surgery and that the graft had a good patency, also confirmed by the 6-month-follow-up US scan (fig.3).

Fig.3: 1-month-follow-up CTA showing a good result of the surgical correction of the endoleak.

DISCUSSION

The 2019 European Society for Vascular and Endovascular Surgery (ESVS) guidelines reported that an expansion of sac diameter of at least 1 cm (a significant growth), detected during the follow-up after endovascular abdominal aortic aneurysm repair using the imaging modality and the measurement method, should be considered for the treatment. A recent systematic review has shown that T2EL after EVAR has a pooled prevalence of 22%, with a reintervention rate of 19%[5]. In addition, EVAR has been reported[6] to be associated with the following features: 1. after EVAR the access to the IMA or LA may be limited; and 2. the recurrence rate of T2EL after an endovascular treatment ranges from 25-80%.

A wide range of treatment options exist, including transarterial embolization, percutaneous direct sac puncture embolization, transcaval embolization, conservative and surgical management[7]. The failure of conservative and endovascular strategies for the treatment of a persistently enlarging T2EL-associated aneurysm is rare, but it requires a surgical approach (tab.1). One of these could be laparoscopy: it remains a technically challenging procedure because of the inflam-

Table 1: Literature review

Study	Type of study
Ken Min Chin et al. Preservation of Stent Graft after Iatrogenic Type III Endoleak during Open Transperitoneal Surgical Intervention for Complicated Type II Endoleak J Vasc Surg 2020;62:496.e1-496.e7.	Case-report
Pierre Maitrias et al. Treatment of sac expansion after endovascular aneurysm repair with obliterating endoaneurysmorrhaphy and stent graft preservation. J Vasc Surg 2016;63:902-8.	Observational study
Madigan MC et al. Occult type I or III endoleaks are a common cause of failure of type II endoleak treatment after endovascular aortic repair. J Vasc Surg 2016;63:9S.	Retrospective study
Aziz A, et al. Outcomes of percutaneous endovascular intervention for type II endoleak with aneurysm expansion. J Vasc Surg 2012;55: 1263e7.	Retrospective study

mation of the sac after EVAR. This strategy is not frequently applied because it is possible in few and selected centers where there are specifically trained vascular surgeons (often in collaboration with specifically trained general surgeons)[8,9]. Another approach is the obliterating endoaneurysmorrhaphy with in situ preservation of the endograft, which was our first plan for the open surgery solution. Furthermore, since some studies[8,10] have reported that some relapsing T2ELs were associated with a different type of endoleak which was missed on the preoperative CTA and since, as we report in tab.1, patients with an occult endoleak may be particularly difficult to manage with the endovascular therapy, we believe an earlier consideration of open surgery (graft explantation included) for patients with an acceptable surgical risk should be advisable. The lessons that we learned with this challenging case of a patient fit for surgery are that: 1. all possible causes of relapsing and complicated type II endoleak should be investigated (also with CEUS or MRI); 2. open surgery represents a good strategy to treat a persistent and relapsing T2EL with an enlarging aneurysm sac. The circumstances which cause the occult endoleak to develop are still unclear. [10]

CONCLUSION

The technical success of open repair surgery on our fit-for-surgery patient confirms that this strategy could be a solution in relapsing and complicated T2ELs. The open surgery strategy should be taken into consideration also for persistent T2EL because it may hide other types of endoleak. Other investigators[10] have recommended the use of alternative diagnostic modalities, such as contrasted-enhanced ultrasound imaging (which should only be performed by experienced angiologists) combined with CTA or pooled magnetic resonance imaging, as effective supporting tools in the detection of occult endoleaks.

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