Eur J Vasc Endovasc Surg **17**, 448–450 (1999)
Article No. ejvs.1998.0599

CASE REPORT

Late Endoleak After Endovascular Therapy for Abdominal Aortic Aneurysm

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Introduction

The objective of endovascular treatment of infrarenal aortic aneurysms is exclusion of the aneurysm from the circulation. One of the failures to achieve this goal is an endoleak. An endoleak is defined as blood flow outside the graft lumen and within the intact aneurysmal sac after treatment of the aneurysm with an endovascular stent-graft.[1] This can be graft-related, or, less frequently, non-graft related through side branches of the aneurysm.

This report presents a case of a late onset endoleak via a lumbar artery after primarily successful endovascular exclusion of an abdominal aneurysm. The occurrence of a late onset endoleak has important implications for the follow-up of these patients.

Case Report

A 55-year-old male was admitted for treatment of an infrarenal saccular aortic aneurysm 4.7 cm in diameter without thrombus in the aneurysmal sac (Fig. 1). This aneurysm was considered perfectly suitable for endovascular stent-graft placement with a bifurcated endoprosthesis.

This patient was included in a multicentre trial for the evaluation of the Chuter-Gianturco bifurcated stent-graft[2] (Meadox Medical, Oakland, NJ, U.S.A.; William Cook Europe A/S, Bjaeverskov, Denmark). The procedure was performed in a combined operating room and angiosuite equipped with a ceiling mounted DSA system (Integris V3000, Philips, Eindhoven, The Netherlands).

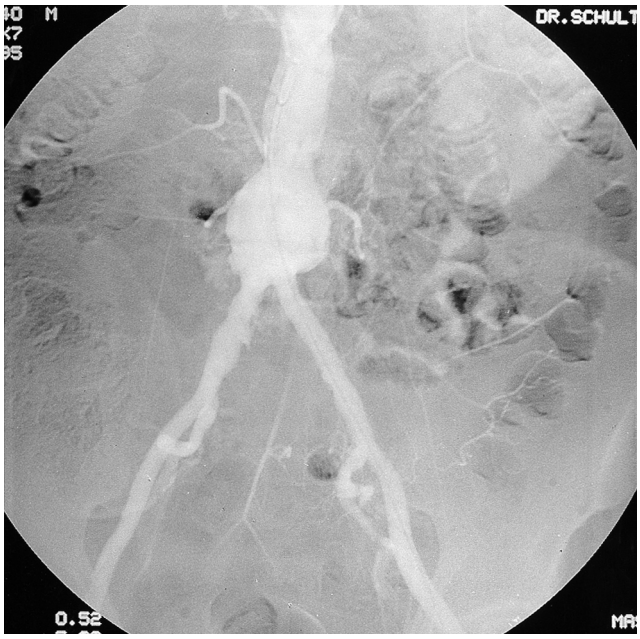

Fig. 1. Aneurysm of the infrarenal aorta suitable for endovascular stent-graft placement. Two lumbar arteries and a patent inferior mesenteric artery arise from the aneurysm.

The introduction and delivery of the stent-graft was uncomplicated. Because of longitudinal folds in the iliac limbs Wallstents were placed in both graft limbs. Angiography at completion showed no sign of an endoleak.

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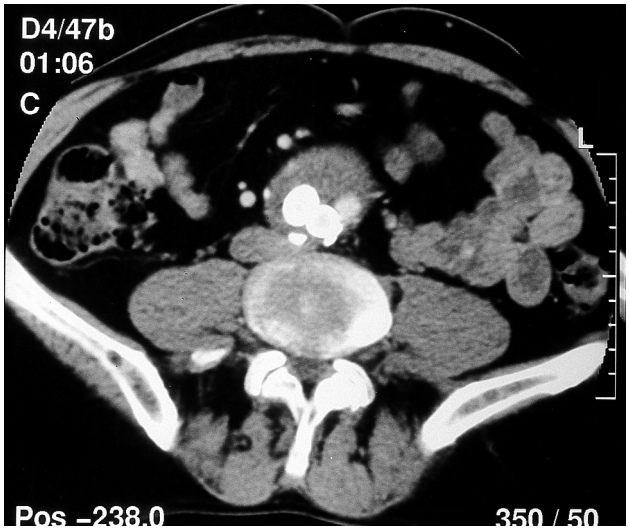

Fig. 2. CT after 6 months with an endoleak.

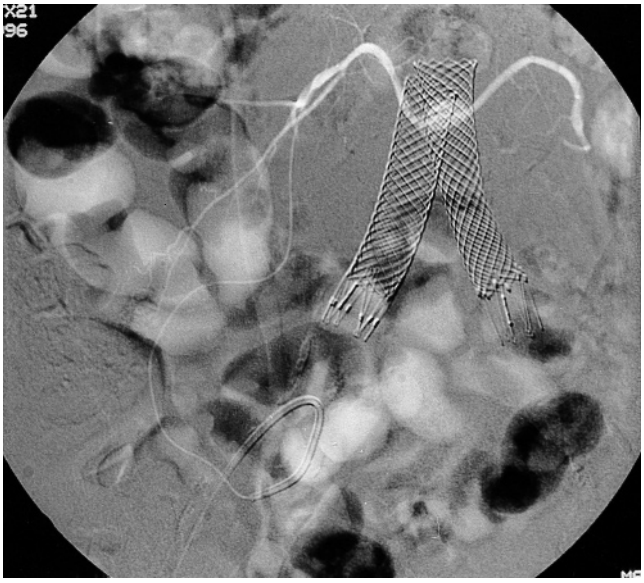

Fig. 3. Selective angiography through the right hypogastric artery showing perfusion of the aneurysmal sac through two patent lumbar arteries.

The follow-up schedule consisted of a spiral CT and duplex ultrasonography within the first week after operation, and thereafter at 6 weeks, 3, 6, 12, 18 and 24 months. Spiral CT was performed both without and with i.v. contrast (150 ml non-ionic contrast, flow 2.5 ml/sec; 40 s scan delay) and 3 ml slice reconstruction.

On the postoperative plain abdominal X-ray there was no sign of stent migration and both duplex ultrasonography and spiral CT revealed no endoleak. Postoperative recovery was uncomplicated and the patient was discharged at the fifth postoperative day.

Three months after treatment, angiography was performed for claudication of the left leg which revealed no endoleak. Both duplex ultrasonography and CT at the same time interval confirmed the absence of an endoleak.

Six months after initial treatment an endoleak was first seen on duplex ultrasonography and confirmed by CT (Fig. 2).

During radiological intervention, angiography showed an endoleak through two patent lumbar arteries at the level of the third lumbar vertebra (Fig. 3).

Embolisation with a microcoil placed at the origin of the right lumbar artery was successful. Duplex the next day showed that the endoleak was absent.

However, because of recurrence of the endoleak related to continuous perfusion of the aneurysmal sac by the lumbar arteries, additional interventions were required at 12 months and 16 months after initial treatment. Both embolisation procedures were performed with histoacryl/lipiodol through selective catheterisation of the lumbar arteries via respectively the left and right hypogastric artery.

Two months after the third embolisation procedure, CT confirmed the absence of an endoleak. Very dense contrast accumulation, interpreted as contrast containing histoacryl, was noted to be present in the aneurysmal sac at the level of the earlier noted endoleak.

During the 16-month follow-up the diameter of the aneurysm increased from 4.7 cm initially, to 5.5 cm at the time of the last embolisation procedure, indicating that the aneurysmal sac was still under pressure. Two months after successful embolisation, there was no change in size of the aneurysm on CT.

Discussion

An endoleak is a well known complication after endovascular treatment of aneurysms. It poses a risk for the patient, because the aneurysmal sac is still pressurised and therefore the risk for rupture is not completely eliminated. The main finding of this case is the development of an endoleak, 3–6 months after initial successful treatment, which paralleled the increase in the diameter of the aneurysm.

Matsumura *et al*. also found that if an endoleak is present after endovascular treatment, the abdominal aneurysm does not shrink or may even enlarge.[3] Both Parodi[4] and Lumsden[5] reported two cases of delayed rupture after endovascular stent grafting procedures due to an endoleak between the stent and vessel wall. Comparable to the mechanism of rupture of a surgically thrombosed abdominal aortic aneurysm,[6,7]

even a thrombosed endoleak may lead to a rupture of the abdominal aneurysm because of the transmission of pressure.

Although an endoleak via lumbar arteries has been reported, so far no report of late reperfusion in the literature is available. Only Blüm *et al.*[8] reported three cases of reperfusion of the aneurysmal sac via lumbar arteries. However, their data do not clearly demonstrate that these endoleaks occurred late after initial successful exclusion of the aneurysm from the circulation.

Currently there is no test that identifies endoleaks with a near 100 per cent sensitivity. Most follow-up schedules consist of spiral CT after i.v. contrast administration and duplex ultrasound on a regular basis, with angiography if these tests are abnormal. Theoretically, an endoleak can be missed on CT because of the thickness of slices or too early or late timing of contrast infusion. In our case, it is very unlikely that endoleak was missed during the first 6 months. Our technique of CT-scanning with 3 ml slice reconstruction and contrast administration is universally accepted as a sufficient procedure. However, longer contrast delay might be able to visualise smaller endoleaks, that were previously missed.

We can only speculate about the mechanism of the development of an endoleak by retrograde flow through a lumbar artery with time. The number of lumbar arteries visualised by angiography before placement of the stent-graft has not been found to be a predictive factor for a delayed endoleak.[3] After endovascular stent-graft placement the antegrade flow through the lumbar arteries stops and most probably thrombosis of both the vessel and the aneurysmal sac occurs. Fibrinolysis of the fresh thrombus mass in the lumbar artery and in the aneurysmal sac may occur by endogenous t-PA within the thrombus.[9] If this is the case, the risk for development of a late endoleak might disappear because thrombi would become resistant to thrombolysis after several months. This report demonstrates that an endoleak may occur several months after successful initial treatment. Since an endoleak is a potentially dangerous complication, this case report underlines that continuous follow-up is mandatory. Furthermore, improvement of monitoring techniques is important. The use of CT with a longer delay after contrast administration has to be investigated. Finally, the risk of small endoleaks has to be established.

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Accepted 10 February 1998