EJVES Extra **10**, 110–113 (2005)
doi:10.1016/j.ejvsextra.2005.08.002, available online at http://www.sciencedirect.com on SCIENCE DIRECT®

SHORT REPORT

Rupture of Abdominal Aortic Aneurysm due to Endograft Infection After Endovascular Aneurysm Repair (EVAR): A Case Report

R. Berchiolli,* D. Adami, S.G. Sardella, A.Del Corso, R.Di Mitri, F. Romagnani and M. Ferrari

Unit of Vascular Surgery, Azienda Ospedaliera Universitaria Pisa (AOUP), 56124 Pisa, Italy

Endograft infection is a rare event, with few reports in the literature.
This report describes delayed infection of an aortic endoprosthesis that eventually resulted in abdominal aortic aneurysm (AAA) rupture. The procedure was performed in an angiographic suite. In the postoperative period the patient developed a central venous line infection. This appears to be the first recognized and reported case in which the infected aortic neck completely dilated due to the radial force of the stent graft.

.

Introduction

After EVAR (endovascular aneurysm repair) patients are followed up because of the risk of complications such as endoleaks, migration and structural defects of the graft.[1] Available data regarding the infection of a stent graft indicate a lower risk compared to a Dacron prosthesis.[2,3]

The infection of an endograft may become a very serious complication when the bacterial contamination involves also the arterial wall.[4] In such cases, disruption of the elastic layer at the level of the neck and the radial force of the stent may lead to dilatation of the aorta, migration of the graft, and ultimately, AAA rupture may follow.

Case Report

A 72-year-old man presented with a 4.8 cm, asymptomatic, infra renal abdominal aortic aneurysm by CT scan. One year earlier the patient had a 4 cm aneurysm documented by ultrasound. The treating cardiologist felt this difference represented rapid expansion of the aneurysm and the patient underwent elective endovascular at an outside institution.

His past history included ischemic heart disease, diabetes, hypertension, tobacco use and obesity.

A pre-operative CT scan showed an abdominal infra renal aortic aneurysm, with a neck longer than 20 mm without angulation. The right common iliac artery was also aneurysmal (Fig. 1). An EVAR procedure was proposed and performed by a cardiologist in the angiography suite.

A bifurcated talent stent graft was implanted, with partial suprarenal fixation with uncovered stent. Embolization of the right hypogastric artery was performed at the same time to allow the right limb of the graft to be seated properly within the external iliac artery.

A few days after implantation, the patient developed sepsis with fever (40 °C) and leukocytosis. A central venous catheter infection with methicillin-resistant *Staphylococcus aureus* (MRSA) was documented. Treatment resulted in resolution of sepsis and normalization of white blood cell count (WBC). Antibiotic therapy specific for MRSA was continued for 3 months.

*Corresponding author. R. Berchiolli, MD, Unit of Vascular Surgery AOP, Presidio Ospedaliero Cisanello, Via Paradisa 2, 56124 Pisa, Italy.
E-mail address: r.berchiolli@ao-pisa.toscana.it

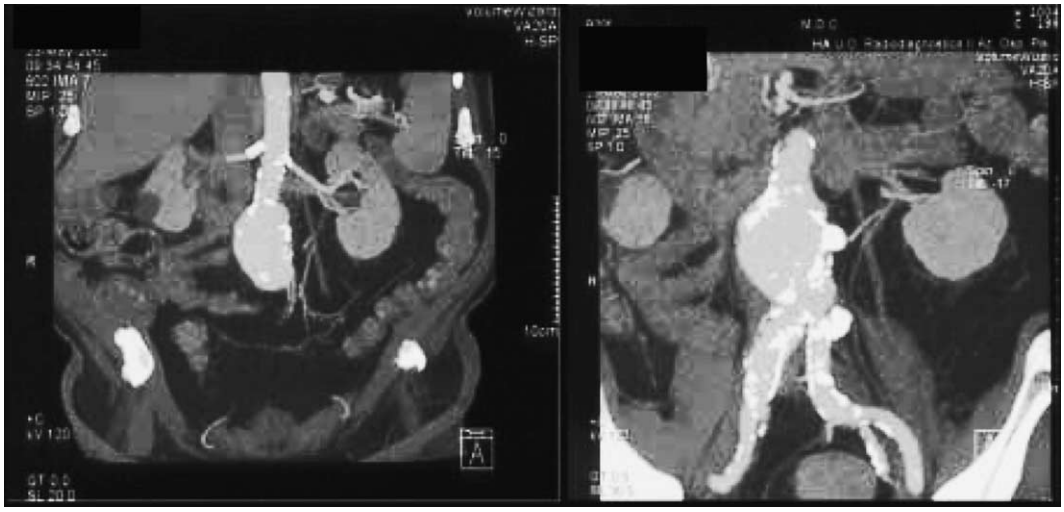

Fig. 1. Preoperative CT scan revealing infra renal abdominal aortic aneurysm with a long neck.

Approximately 6 months postoperatively the patient was admitted to our hospital with abdominal and back pain, weakness, anorexia, and unstable angina. Laboratory test results revealed an elevated white blood cell count, a marked increase in C-reactive protein level 191 mg/l (range 0.0–5.0) and erythrocyte sedimentation rate of 33 mm/h (range <25).

Abdominal-pelvic CT scan upon admission revealed an increased size of aneurysm with a large surrounding inflammatory reaction, extending above the left renal vein, without radiographic evidence of rupture of the aneurysm or endoleak (Fig. 2).

An indium-labeled leukocyte scan demonstrated increased activity corresponding to the infra renal abdominal aorta.

Although an infection of the endograft was suspected, due to his poor general condition with angina, non-surgical therapy was attempted and antibiotic treatment initiated with teicoplanin (200 mg, twice daily) and imipenem (1 g, three times daily). Surgery was deferred until stabilization of the general and cardiac conditions.

However, an appropriate response with antibiotic therapy was not achieved. Seven days later, the patient remained febrile, the WBC count remained

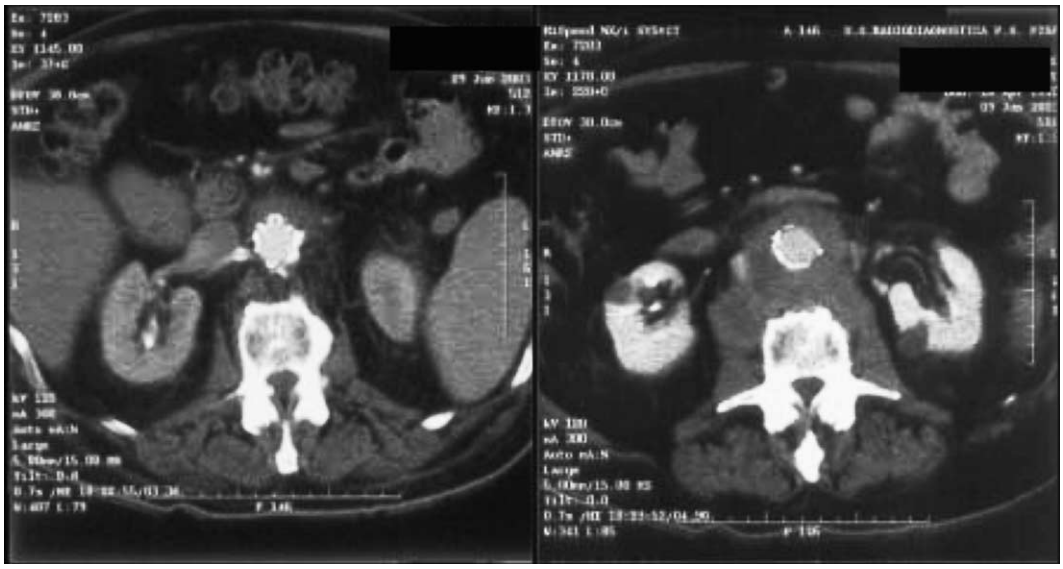

Fig. 2. Upon admission CT scan with delayed contrast medium, revealing an increased size of aneurysm without radiographic evidence of rupture of the aneurysm.

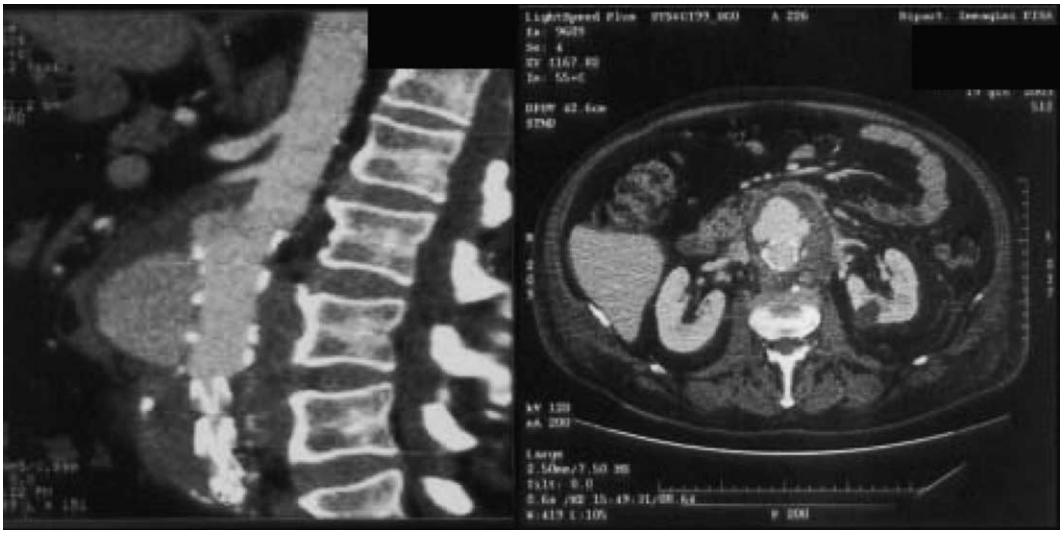

Fig. 3. CT scan with delayed contrast medium, at the time of rupture, demonstrating a dilation of the aorta at the renal level and the migration of the endograft.

elevated and the erythrocyte sedimentation rate was 55 mm/h. His general condition was still quite compromised with exacerbation of low back and abdominal pain that radiated to the inguinal regions. He had no signs or symptoms of hemodynamic compromise, neither hypotension nor hypovolemia.

A repeat CT scan showed a retroperitoneal hematoma suggestive of contained aneurysm rupture and proximal type I endoleak (Fig. 3). The patient was then taken to the operating theater for laparotomy.

After a long midline incision, an impressive inflammatory reaction with purulent collection was observed surrounding the entire aneurysm wall, the renal arteries and the iliac arteries. The duodenum was densely adherent to the aneurysm sac.

No suitable proximal aneurysm neck was identified, therefore, supraceliac aortic control was obtained. The aneurysm was opened and the rupture was identified in the right posterolateral aspect with hemorrhage into the retroperitoneum at this site. The proximal end of the graft was loose and it was easily removed. *In situ* reconstruction was contraindicated due to the bacterial contamination of the retroperitoneum, therefore, the aortic stump was ligated and an extra-anatomic bypass was performed.

The patient developed multisystem organ failure and died 48 h postoperatively.

Microbiological cultures of the contents of the aneurysm sac, of the aneurysmal wall and of the endoluminal graft, grew *S. aureus*.

Discussion

Endovascular aneurysm repair is gaining wider acceptance as a feasible alternative to conventional open repair, especially in high risk patients.[5]

Complications after endovascular repair of abdominal aortic aneurysms are most commonly related to endovascular leaks and rupture of the aneurysms.[2]

Infection after stent graft repair is uncommon and its contribution to the development of type I endoleak and rupture of the aneurysm has not previously been reported.

In this reported case, the sequence of the pathological steps are not clear. At the time of the initial implantation there was neither clinical nor radiographic (CT scan) evidence of inflammatory or mycotic aneurysm. We speculate that the source of infection of the endograft could be related to the reported infection of the central venous catheter implanted at the time of the endovascular repair. The use of an angiography suite, as an operative theatre for an AAA repair, has been recently questioned by some authors, because such an environment cannot be considered as sterile as an operative suite.[6]

Moreover, internal iliac artery embolization had been performed at the time of the aortic endograft implantation. This may have contributed to the endograft contamination by increasing the time of procedure and catheter maneuvers.

At emergency operation, almost complete detachment of the proximal portion of the graft was found, the endograft was not incorporated in the aneurysmal

sac. The previously preserved infra renal aortic neck was aneurysmal with macroscopic evidence of bacterial aortitis.

Among the cases described by other authors concerning aortic endograft infection with or without subsequent AAA rupture, this case appears to be the first in which a rapid expansion of the aortic neck could be demonstrated. In our opinion the infection and graft contamination were the initial steps, followed by the aortic wall infection. The strong radial force of the endograft contributed to dilation of the infra renal aorta, disrupting the seal between the graft and the aorta leading to a type I endoleak. The proximal endoleak acutely pressurized the sac which ultimately ruptured.

Conclusion

This case emphasizes the risk of infection of an aortic endograft and the need of the highest level of sterility at the time of implantation.[6]

In the case of increased risk of prosthetic infection, such as confirmed presence of infection elsewhere, prolonged antibiotic therapy is mandatory.[2–6]

When signs of infections are evident, early removal of the graft and aneurysm resection may provide a successful solution. However, *in situ* reconstruction is contraindicated if infection is present. In our case, at the time of surgery, the aneurysm extended suprarenal and the extent of infection prevented us from a possibly easier *in situ* reconstruction,[7] and aortic stump ligation with extra-anatomic bypass was required.

References

1 Dattilo JB, Brewster DC, Fan CM, Geller SC, Cambria RP, LaMuraglia GM *et al*. Clinical failures of endovascular abdominal aortic aneurysm repair: incidence, causes, and management. *J Vasc Surg* 2002;**35**:1137–1144.

2 Alankar S, Barth MH, Shin DD, Hong JR, Rosemberg WR. Aortoduodenal fistula and associated rupture of abdominal aortic aneurysm after endoluminal stent graft repair. *J Vasc Surg* 2003;**37**: 465–468.

3 Heikkinen L, Valtonen M, Lepantalo M, Saimanen E, Jarvinen A. Infrarenal endoluminal bifurcated stent graft infected with *Listeria monocytogenes*. *J Vasc Surg* 1999;**29**:554–556.

4 Parsons RE, Sanchez LA, Marin MM, Holbrook KA, Faries PL, Suggs WD *et al*. Comparison of endovascular and conventional vascular prostheses in an experimental infection model. *J Vasc Surg* 1996;**24**:920–926.

5 Lau L, Hakaim AG, Oldenburg A, Neuhauser B, McKinney M, Fumagalli RP *et al*. Effect of suprarenal versus infrarenal aortic endograft fixation on renal function and renal artery patency. A comparative study with intermediate follow up. *J Vasc Surg* 2003; **37**:1162–1168.

6 Eliason JI, Guzman RJ, Passman MA, Naslund TC. Infected endovascular graft secondary to coil embolization of endoleak: a demostration of the importance of operative sterility. *Ann Vasc Surg* 2002;**16**:562–565.

7 Baker M, Uflacker R, Robison JG. Stent graft infection after abdominal aortic aneursym repair: a case report. *J Vasc Surg* 2002; **36**:180–183.

Accepted 3 August 2005