EJVES Extra **4**, 48–51 (2002)
doi:10.1053/ejvx.2002.0171, available online at http://www.idealibrary.com on IDEAL®

SHORT REPORT

Aorto-enteric Fistula following Abdominal Aortic Aneurysms Repair by Endograft

Roberto Gattuso*[1], Bruno Gossetti[1], Fabrizio Benedetti-Valentini[1] and Plinio Rossi[2]

Departments of [1]Vascular Surgery and [2]Radiology, "La Sapienza" University of Rome, Italy

Introduction

Endovascular aneurysm repair (EVAR) of abdominal aortic aneurysms (AAA) by endografting is an increasingly common procedure. The enthusiasm for this technique is due to a hypothetical lower incidence of mortality, mainly in poor-risk patients, a shorter hospital stay and reduced costs when compared to open surgery. The more patients that have been treated, the longer the follow-up interval becomes and the more likely the appearance of complications. We describe here a case of aorto-enteric fistula appearing 22 months after the implantation of an endovascular graft (Vanguard II) for AAA.

Case Report

A 67-year-old man was admitted to our department with an AAA 5.5 cm in diameter. Twenty years previously he had undergone total cystectomy for cancer of the bladder with bilateral uretero-sigmoidostomy and had an infection of the abdominal wall which was treated conservatively. The patient also had cardiac problems treated with calcium blockers and nitrates, and mild renal failure with BUN values ranging from 35 to 50 mg/dl and a serum creatinine level between 2 and 3.5 mg/dl. The patient had also a history of hepatitis C.

A spiral CT scan and a calibration angiogram showed an EVAR to be possible. Hostile abdomen was the main indication for an endovascular procedure. In December 1998 the patient was submitted to endovascular grafting of the aneurysm using a Vanguard II prosthesis. The procedure was smooth and the postoperative period uneventful; the patient was discharged after four days in good condition with ticlopidine twice daily. Colour duplex scanning and contrast spiral CT scans were done at 3, 6, and 12 months; the aneurysm diameter had decreased and no signs of endoleak were observed.

Seventeen months after implantation, the patient was admitted as an emergency to our hospital with symptoms of acute ischaemia of the left lower limb and no femoral pulse. A spiral CT scan showed kinking and occlusion of the left branch of the endograft (Fig. 1) and no sign of endoleak. Angiography and recanalisation of the branch by local thrombolysis were not attempted for fear of complications leading to a potentially very difficult laparotomy. A femoro-femoral

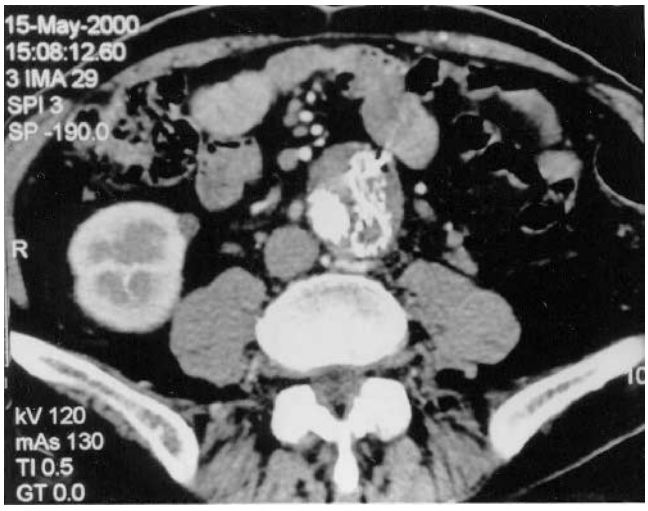

Fig. 1. Spiral CT scan (17 months after implantation) shows kinking and occlusion of the adjunctive left branch.

* Please address all correspondence to: R. Gattuso, Via Appia Antica 228, 00178 Roma, Italy.

crossover bypass was carried out successfully by means of an externally supported thin-wall 6-mm PTFE carbon graft. No further complications occurred in the following postoperative period.

During October 2000, one year and ten months after endograft implantation, the patient developed a septic fever with a leukocytosis and alterations in specific serum inflammatory parameters. He was treated by his family doctor with antibiotics. After some days an episode of melaena occurred and the patient was rushed to hospital where a CT scan detected further displacement of the occluded left branch of the graft, which pushed the aneurysm wall against the upper jejenum. There were air bubbles within the mural thrombus and the aneurysm had expanded to 6.5 cm (Fig. 2). An aorto-enteric fistula was diagnosed and the patient was taken to surgery.

A right axillo-femoral bypass was performed first with a distal anastomosis on the crossover graft. After the closure of the wounds and careful dressing, a midline laparatomy was carried out keeping away from the suprapubic area and the crossover graft. When the fistula between the graft and the bowel was found, the patient was given 5000 IU of heparin and the aorta and the iliac arteries were clamped. The jejunal segment was detached and tears in the wall of the bowel and the aneurysm were exposed. An end portion of the left limb of the endograft was slightly protruding through the aneurysm tear. A short segmental intestinal resection was needed; the entire reconstructed segment was rotated to the right and away from the aorta. The aneurysm was then opened and the endograft was removed. The adjunctive limb was completely detached from the main body. It was obviously pushing against the anterior aspect of the aneurysm wall. After removal of the thrombus a couple of lumbar arteries were found to be bleeding and were sutured. Partial resection of the wall, complete revision and cleaning of the remaining cavity was carried out. The stumps of the aorta and the iliac arteries were sutured with a double layer of 2/0 polypropylene sutures and a segment of omentum was moved down to cover and isolate the aorta. A drain was placed in the retroperitoneum and

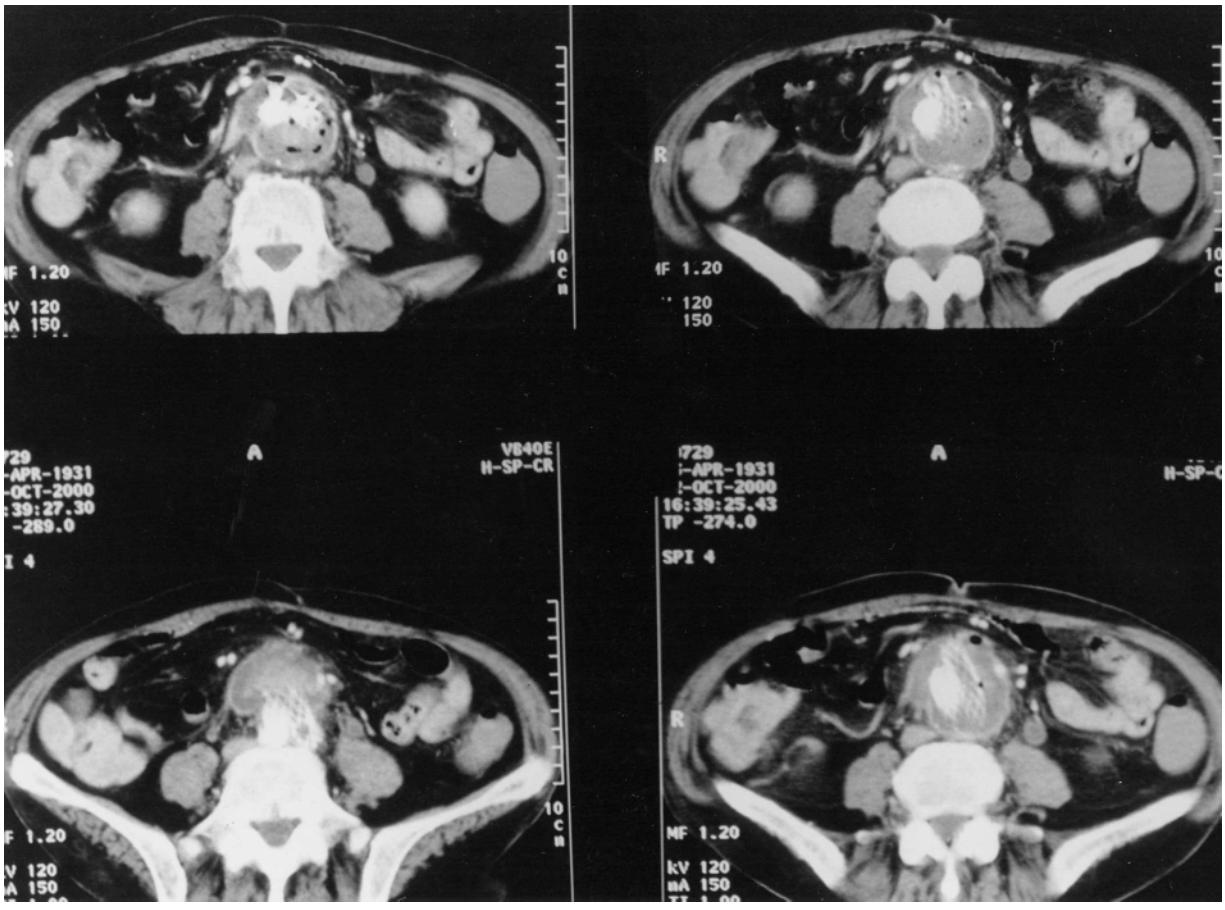

Fig. 2. Spiral CT scan (22 months after implantation) shows deplacement of the occluded left branch against the first jejunal segment with air bubbles inside the thrombus and enlargement of the aneurysm itself.

removed three days later, nothing coming out but few millimetres of fluid vaguely stained with blood.

Antibiotic therapy with imipenem (3 g daily) and amikacin (1 g daily) was started just before the operation and was continued for fifteen days. During the first week renal function worsened, but recovered to preoperative levels before discharge.

A spiral CT scan carried out 15 days after surgery showed secure closure of the aorta, no fluid collection, no signs of infection and a patent axillo-bifemoral bypass (Fig. 3). The postoperative course was uneventful.

The patient was discharged well after twenty days. Clinical, laboratory, duplex ultrasound and CT scans carried out 2 and 3 months postoperatively showed a stable position and no particular problems.

Discussion

Early results of stent grafting for AAA were and are very promising and many mid-term and some long-term excellent results have been achieved.[1,2] However, some clinical trials and institutional experience indicate a complication rate at mid-term of from 8% to 44%,[3] the most frequent being endoleaks, graft limb thrombosis, partial or total displacement or detachment of the graft. Rupture of the aneurysm is relatively rare and due to incomplete exclusion of the sac, secondary to endoleaks and endotension.[4] An aorto-enteric fistula is definitely rare and occurs under particular conditions. Only four cases are reported in the literature to date: in two of them a Stentor device was involved and no endoleak was demonstrated;[5,6] one patient had a Vanguard (Boston Scientific)[7] endoprosthesis implanted successfully but with no decrease of aneurysm size though no leak was apparent. The fourth patient was treated with a tailor-made device with a suprarenal, uncovered, barbed stent (Zenith – Cook) and no endoleak was detected either early after deployment or later when the complication occurred.[8] Because of intercurrent terminal disease, this patient was not reoperated upon and faced sudden death from aortic rupture. All aorto-enteric fistulae were

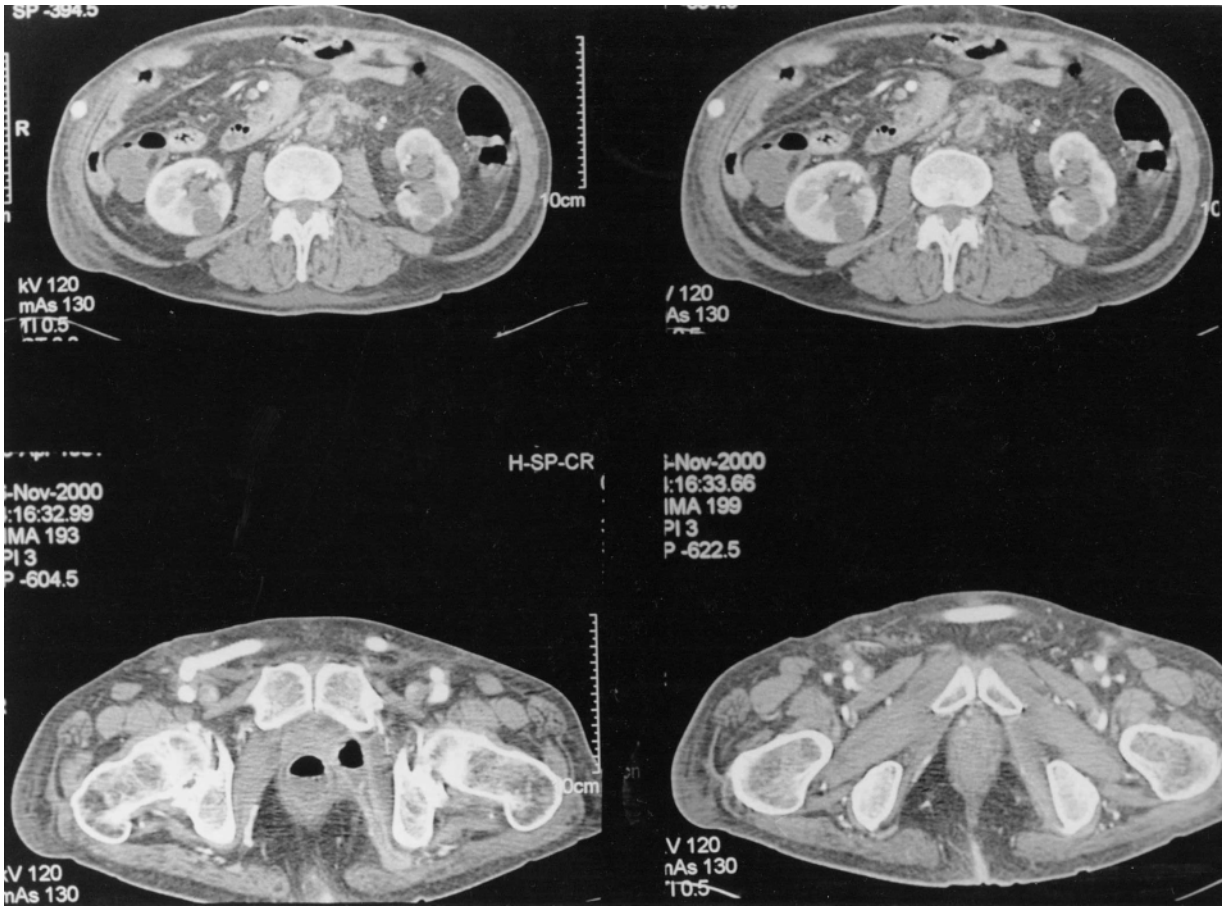

Fig. 3. Spiral CT scan (15 days after redo surgery) shows the stump of the aorta, the absence of fluid collection and a patent axillo-bifemoral bypass.

diagnosed between 6 and 22 months after surgery. In one case[6] an inflammatory process was identified by clinical data, laboratory and MR investigations and at surgery intimate adhesions were found between the aneurysm wall and the duodenum. In addition some sutures between the nitinol wires were broken and a large tear was found in the endograft fabric. Possibly mechanical trauma against the aorta and attached bowel plus new endotension led to rupture and to an aorto-enteric fistula.

In another case[5] enlargement of the aorta at the level of the proximal attachment of the device, across the renal arteries, was the main cause for secondary severe leaking, endograft migration, disruption of the non-covered proximal end, tilting and kinking of the entire skeleton of the device. Eventually one of the graft limbs was forced against the wall of the aneurysm adding mechanical trauma to endotension. In a third patient[7] downward migration of the endoprothesis, marked angulation, disconnection of the additional limb, secondary endoleak, trauma against the aneurysmal wall and erosion of the duodenum were clearly documented. In the last case,[8] although the infection of the sac and the fistula with the duodenum were evident, no leak was ever detected and no twist or displacement of the graft occurred. Possibly the patient's Crohn's disease and uncontrollable myelodysplasia played a role both in the adhesion of the bowel to the aneurysm and in the origin of the infection. Therefore mechanical trauma due to graft migration and/or displacement seems to be the cause of aorto-enteric fistula in three out of four of the reported cases.

The mechanism of perforation of both aorta and bowel wall seems pretty similar in our case, since a detached and displaced left limb of the endograft was directly protruding through the upper and anterior aspect of the aorta below the renal arteries and into the intestinal lumen. Less clear is how this happened after the thrombosis of that limb and how a secondary leak was established. Possibly some kinking and/or twisting happened first leading to thrombosis; then continuous pulsation within the graft and against the blind end of the occluded limb led to slow detatchment from the main body but not to an endoleak. None was seen either on CT or on the colour duplex scan and the aneurysm presumably did not enlarge until just before symptoms appeared. The presence of bleeding lumbar arteries at operation does suggest some degree of endoleak, or possibly of recanalisation of these vessels associated with infection and liquefying of the mural thrombus.

As far as the adhesion of the bowel to the aortic wall is concerned, it is well known that endografting causes a strong inflammatory response in some patients in the early postoperative days with fever and leukocytosis (21 000 white cells in our patient). Some authors[9,10] have studied and documented this process and it might be the second most important factor in producing an aorto-enteric fistula. The prognosis of aorto-enteric fistula following open aortic surgery, either for AAA or for occlusive disease, is poor, with death and limb loss rates of from 25% to 65%. It does not seem to be the same with aorto-enteric fistulae after stent grafting. All four cases who were operated upon, three from the literature and this one, had favourable short- and medium-term results. Moreover, in two cases an extra-anatomical revascularisation was carried out, while in the other two an *in situ* replacement was carried out without recurrence of the infection. No conclusions can be drawn from the type of infection seen; five cases are too few and the follow-up is too short. The need for careful investigations of patients treated by an aortic endograft is definitively confirmed.

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