Endovascular abdominal aortic aneurysm repair complicated by spondylodiscitis and iliaco-enteral fistula

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Infections of abdominal aortic endografts are rare. There are no reports on the association with spondylodiscitis. We report a case of a 74-year-old man who underwent endovascular aneurysm repair (EVAR) and subsequently femorofemoral bypass placement due to occlusion of the right limb of the endograft. Six months later, he presented with rectal bleeding, weight loss, back pain, and low abdominal pain. Computed tomography revealed extensive abscess formation with air in and around the endograft and psoas muscles, in continuity with destructive spondylodiscitis L3-4. There was a small bowel loop in close proximity to the occluded right leg of the endograft, which was filled with air bubbles. An axillofemoral bypass was created followed by a laparotomy. Intra-operatively, an iliaco-enteral fistula was found. The small bowel defect was sutured, the endograft completely removed, and the infrarenal aorta and both common iliac arteries were closed. Necrotic fragments of the former L3-4 disk were removed. The postoperative course was uneventful. Seven months postoperatively, the patient had recovered well. Iliaco-enteric fistula and spondylodiscitis are rare complications of aortic aneurysm repair. This is the first report of spondylodiscitis after EVAR. (J Vasc Surg 2008;47:1330-2.)

During the last decades, endovascular aneurysm repair (EVAR) has become a prominent alternative to conventional open surgical repair (OSR) of abdominal aortic aneurysms (AAA). Aortic graft infection is a rare complication of both procedures and is slightly more common following OSR or reinterventions.[1,2] Conventional OSR of AAA has a reported graft infection rate of 0.5% to 3%.[2] Following EVAR, Sharif et al noted an incidence of 6.2/1000 person-years in 509 patients.[3] A retrospective study noted an infection rate of 0.43% after 9739 endovascular procedures:[1] 31% were associated with an aorto-enteric fistula. Other direct related complications were cutaneous fistula and septic embolization. To our knowledge, no EVAR-associated spondylodiscitis has been reported to date.

We present an exceptional case in which an iliaco-enteral fistula and pyogenic spondylodiscitis developed after EVAR and a subsequent femorofemoral bypass.

CASE REPORT

A 74-year-old man underwent EVAR for a 63 mm infrarenal abdominal aneurysm. Premedical history included transient ischemic attack, myocardial infarction, and stabile angina pectoris. EVAR was performed under general anaesthesia (Talent, Medtronic, Santa Rosa, Calif). The intraoperative angiography showed a good position of the stent graft without signs of endoleak or stenosis. Postoperative plain abdominal radiography and duplex sonography showed proper positioning of the endograft and the absence of stenosis or endoleak. Two weeks later, however, he was readmitted with occlusion of the right leg of the endograft. Thrombolysis with urokinase was not successful. Therefore, a femorofemoral cross-over bypass was made using a 6 mm gelatin-impregnated polyproylene prosthesis (Vascutek, Inchinnan, Scotland). At day 26 after surgery, patient was discharged from the hospital in good ambulatory condition.

Six months after the reintervention, he presented with acute rectal blood loss, 10 kg weight loss in the preceding 2 months, and low abdominal pain. He had developed a progressive lower back pain and thigh pain, predominantly right-sided in the months before. Physical examination raised suspicion of a right-sided radicular syndrome. Laboratory findings included leukocytes 14.4×10^9/L (normal 4-11 $\times$ 10^9/L), erythrocyte sedimentation rate 104 mm/h (normal <20 mm/h), C-reactive protein 376 mg/L (normal <10 mg/L), urea 71.4 mg/dl (normal 7-25 mg/dl), creatinine 2.6 mg/dl (normal 0.7-1.2 mg/dl), and slightly elevated liver enzymes. Bacterial urine cultures revealed *Escherichia coli* that were treated with sulfamethoxazole and trimethoprim. Colonoscopy did not identify a bleeding focus. Since the patient had undergone previous aortic surgery, an aorto-enteral fistula was suspected. A spiral computed tomography (CT)-scan showed extensive abscess formation with air in and around the endograft and bilaterally in the psoas muscle compartment in continuity with destructive spondylodiscitis L3-4 (Fig 1). There was a small bowel loop in close proximity to the occluded right leg of the endograft, which was filled with air bubbles. It was decided to perform an emergency operation. First, a left-sided axillofemoral bypass was created using a 6 mm Dacron prosthesis. During subsequent laparotomy, part of the small intestine appeared to adhere to the right

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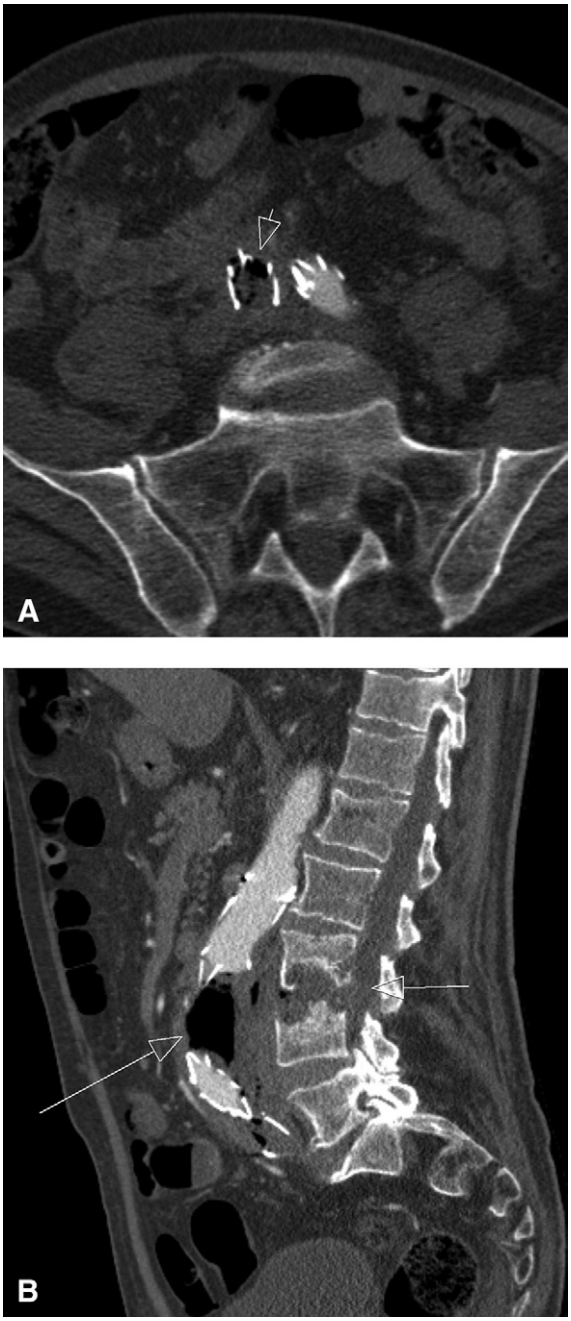

Fig 1. Abdominal computed tomography (CT)-scan 6 months after endovascular repair of an infrarenal aneurysm. **A,** Transversal view at the level L5-S1 showing an ileal loop in close proximity to the occluded right leg of the endograft, which is filled with air. **B,** Sagittal view showing an abscess with air/fluid level in the excluded aortic aneurysm, air in and around the occluded right leg of the endograft in continuity with destructive spondylodiscitis L3-4.

common iliac artery. After detachment of the bowel loop, a defect hole was present in the small bowel and the endograft was visible through a defect in the arterial wall (Fig 2). The small bowel defect was closed, the endograft completely removed, and the

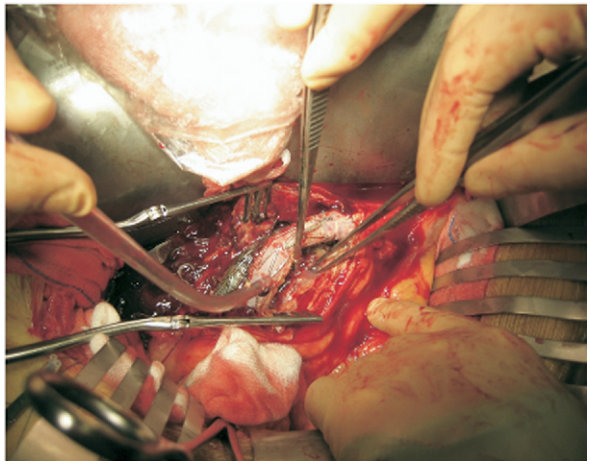

Fig 2. Peroperative picture demonstrating an intact aorto-bi-iliac endograft, without endoleak, after removal of the adhered small bowel.

infrarenal aorta and both common iliac arteries were closed using nonresorbable sutures. Necrotic fragments of the former L3-4 disk were removed, followed by extensive debridement of the abscess.

The postoperative course was uneventful. Bacterial cultures of the abscess showed *E coli* as well as multiple anaerobic bacteria. The patient was treated with intravenous clindamycin, piperacillin, and tazobactam for 6 weeks, substituted by oral amoxicillin-clavulanate potassium for 6 months. Control CT-scan after 1 month showed a reduction of the soft-tissue mass, as well as the absence of nerve root compression. No signs of persistent infection were observed. Serum levels of leukocytes and C-reactive protein were normalized. Duplex sonography showed patent axillofemoral and femorofemoral crossover bypass. Seven months postoperatively, the patient has recovered apart from some remnant pain in the right thigh. Close follow-up including repeat imaging of the region is scheduled.

DISCUSSION

The present report describes a case in which EVAR was complicated by an iliaco-enteral fistula and pyogenic spondylodiscitis. To our knowledge, this is the first reported case of pyogenic spondylodiscitis as a complication of EVAR.

Infective complications of aortic aneurysm repair are extremely rare.[1-3] The infection rate of endografts appears to be higher after reinterventions. Seemingly, such reinterventions are more common after EVAR.[3] In the aforementioned retrospective study[1], 29.2% of EVAR procedures that were complicated by infection, had been followed by at least one adjuvant endovascular procedure. Since these procedures involve skin penetration, cutaneous flora is a potential origin of infection. After embolization procedures, *S aureus* was identified as the infectious agent in 85% of cases.[1] The limb occlusion 2 weeks after the initial procedure may have been critical in the development of the graft infection in our patient. The intraoperative angiography and postoperative duplex scanning have not showed a stenosis. The reason for the occlusion, and failed urokinase therapy, remained

unclear. Infection in particular is associated with graft thrombosis and might have been present at the time of initial limb thrombosis. At that stage, however, patient had no clinical signs of infection. The secondary procedure may also have caused the graft infection. However, cutaneous flora did not appear to be the source of infection in view of the multiple organisms cultured in the abscess. Reviewing the initial preoperative CT scan showed no signs of iliac artery infection of discitis, which could have caused the graft infection before endograft placement. Patient had no signs of infection or lower back pain before initial surgery.

In case of aorto- or iliaco-enteral fistula, it is often hard to determine whether primary infection of the endograft caused erosion of the intestinal wall, or that a bowel defect exposed the aorta to infectious agents. Sharif et al favored the first hypothesis in their two patients.[3] In our patient, this question remains unanswered. Although the multiple pathogens found in the abscess are most likely intestine-derived, the initial mechanism of erosion remains elusive since these pathogens could have infected the area secondarily after fistulisation. A third possibility is that initial pyogenic spondylodiscitis locally extended to the endograft, thereby also involving a small part of the intestine. We consider the urinary tract infection at presentation as unrelated to the other findings, especially since only one pathogen was cultured.

Only a few cases of aortic aneurysm repair-associated spondylodiscitis or osteitis have been reported, all after conventional OSR. In one case, an infrarenal aortic graft was removed after 6 years because of aortoduodenal fistulization and replaced by an axillobifemoral bypass. Five years later, he presented with a spondylodiscitis of L2, caused by *Torulopsis glabrata*. The authors concluded that the spondylodiscitis was most probably due to direct extension from the adjacent, previously infected periaortic tissue.[4] Such local extension was also reported by O'Donnell et al, who recently described a case of *Coxiella burnetii* infection of an infected aortic graft and osteomyelitis L3-4.[5] Ten cases of *C burnetii* infection of either an aortic aneurysm (n = 7) or vascular graft (n = 3) were described by Fournier et al. All underwent surgery, with subsequent development of contiguous vertebral osteomyelitis in three, aortoduodenal fistula in two, and lethal hematemesis in one.[6] Interestingly, in another case, discitis and aortic graft infection seemed to have arisen independently from one another from disseminated *S aureus* infection. The abscess surrounding the aortic graft did not communicate with the infected lumbar disk.[7] Overall, however, graft infection extending to a lumbar segment seems more common than vice versa.

The association of spondylodiscitis and infected aortic grafts is rare, and clinical manifestations are variable and unspecific. CT imaging is essential in patients with aortic grafts and symptoms like lumbar pain, radicular syndrome, fever, abdominal pain, and/or rectal blood loss. Graft infection is suspected if periprosthetic tissue infiltration and/or fluid- or gas-filled collections are present.[7] In case of inconclusive conventional CT scanning, a combination of CT with positron emission tomography with 2-deoxy-2-fluoro-d-glucose (FDG-PET/CT) may be better at differentiating between infected and noninfected aortic grafts.[8,9] The adjacent spinal segment should be assessed carefully for signs of spondylodiscitis. However, noninfectious vertebral destruction has also been described in two patients with an aortic endograft and pseudoaneurysm.[10] Therefore, cultures of blood and suspected tissues are essential for proper diagnosing and treatment. The most common organisms found in infected aortic grafts are *S aureus, S epidermidis, Salmonella* spp, and gram-negative enteric bacteria, but in cases with spondylodiscitis or osteitis, several other organisms were found.[1,3-7] In case of infection, a combination of graft replacement, debridement of abscesses, and targeted long-term antibiotic treatment is mandatory. Surgical treatment options are replacement with an extra-anatomical bypass or complete graft removal with subsequent in situ reconstruction. In Ducasse's study, excision of the infected stent graft followed by in situ reconstruction provided the best outcome.[1] Guidelines on either the ideal duration of antibiotic treatment or the proper medications are nonexisting. Most physicians rely on parameters of infection and local microbiological expert opinion.

In conclusion, both iliaco-enteric fistula and spondylodiscitis are rare complications after open aortic aneurysm repair, and even more rare after endograft placement, especially involving an iliac limb. This is the first report of spondylodiscitis after EVAR, which was successfully treated by replacement of the endograft with an extra-anatomic bypass, and long-term antibiotic treatment.

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