Diagn Interv Radiol 2009; 15:153–156

Air within the aneurysm sac following endovascular management of abdominal aortic aneurysm in a patient with acute pancreatitis

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ABSTRACT
A 44-year-old man with an abdominal aortic aneurysm presented with acute pancreatitis with abundant peripancreatic fluid and was successfully treated with endovascular stent graft. Early post-procedural radiological examinations showed air inside the aneurysm sac. Due to the possible infection from pancreatitis, antibiotic treatment was initiated, and he was closely monitored. Serial radiological examinations showed gradual decrease and eventual resolution of air at the end of one month. Follow-up computed tomography 10 months post-implantation revealed no problems. The presence of air inside the aneurysm sac could be a sign of graft infection. Although the air usually resolves spontaneously, close surveillance is necessary for cases with higher risk of infection.

Key words: • *aortic aneurysm, abdominal* • *stent-graft* • *pancreatitis* • *infection*

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Received 31 August 2007; revision requested 30 October 2007; revision received 24 November 2007; accepted 8 December 2007.

In patients with aneurysm and significant comorbid conditions, endovascular stent graft implantations are less invasive than open surgery and are often preferred to surgery for this reason (1). Although much progress has been made in the endovascular field, aortic graft infection, after either open surgery or endovascular stent graft implantation, is still one of the most catastrophic complications. An important radiological finding of graft infection is the detection of air inside the aneurysm sac (2). In this report, we present a patient with acute pancreatitis and abdominal aortic aneurysm (AAA) who was treated conservatively for pancreatitis and had a stent graft implantation for AAA. An air bubble was detected within the thrombosed aneurysm sac during the early post-implantation period; this resolved one month after the procedure.

Case report

A 44-year-old man with a history of alcohol consumption was admitted to our emergency department with abdominal pain and fever. Laboratory investigations revealed an elevated serum amylase (140 U/L), a white blood cell (WBC) count of 14.2×10^9/L, and a C-reactive protein of 140 mg/L. A clinical diagnosis of acute pancreatitis was made. Abdominal ultrasound (US) and spiral computed tomography (CT) examinations showed pancreatitis and the presence of a 5.5 cm infrarenal AAA (Fig. 1). The pancreas appeared inflamed, with abundant and extensive peripancreatic fluid that extended between fascial planes, but there was no evidence of pseudocyst formation. Treatment with imipenem and amikacin was initiated. After 10 days of treatment, WBC count decreased to 6,000 and clinical symptoms disappeared. Diagnostic angiography was performed that showed an infrarenal AAA with a favorable neck anatomy (Fig. 2). After a full discussion of the risks and advantages of open and endovascular repair, the patient opted for endovascular AAA repair. A bifurcated Talent stent graft (Medtronic, Minneapolis, USA) was deployed via bilateral transfemoral access (Fig. 3). Completion delayed angiograms revealed a small endoleak interpreted as a type II leak. Endoleak was not treated at the time of stent graft implantation and left for spontaneous thrombosis. An abdominal control CT study performed 6 days after implantation demonstrated the presence of an air bubble between the endograft and the excluded aneurysmal sac (Fig. 4) and a minimal endoleak originating from inferior mesenteric artery. Multiplanar reformatted (MPR) coronal and sagittal CT images showed gas dimensions of 23 × 13 × 5 mm. Although the patient was doing well without symptoms and signs of infection or sepsis, because of the presence of air inside the aneurysm sac and remnant pancreatic fluid, he was started on broad-spectrum antibiotic therapy with moxifloxacin hydrochloride with a presumptive diagno-

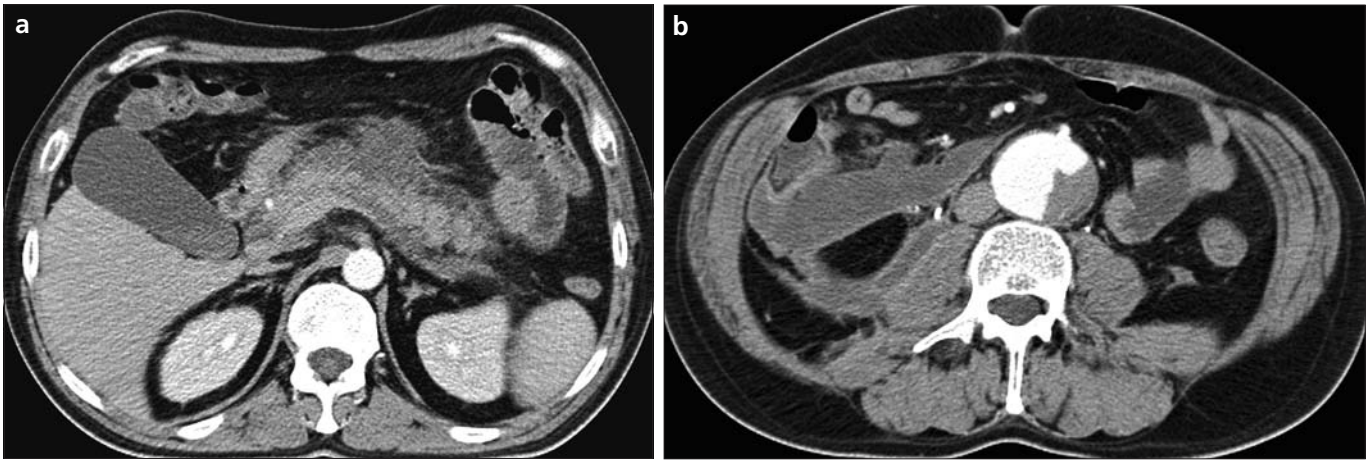

Figure 1. a, b. Admission contrast enhanced abdominal CT images **(a, b)** demonstrating inflamed pancreas with abundant peripancreatic fluid extending between fascial planes without evidence of pseudocyst formation **(a)** and a 5.5-cm infrarenal abdominal aortic aneurysm **(b)**.

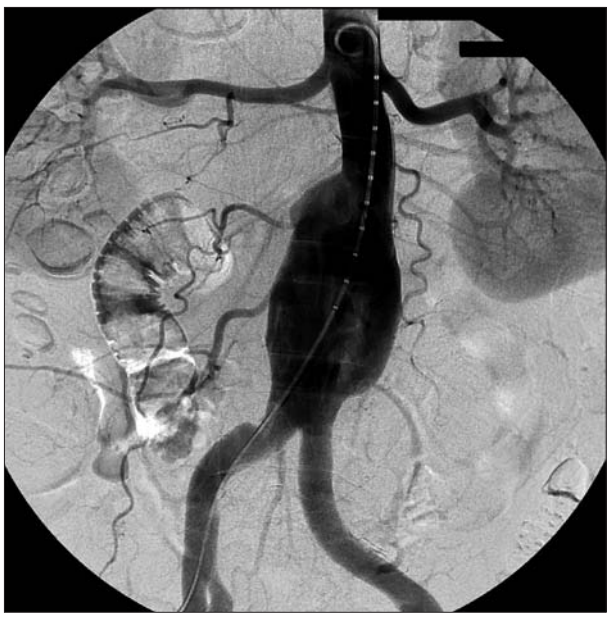

Figure 2. Diagnostic angiogram shows favorable anatomy of the neck of the aneurysm.

Figure 3. Completion angiogram obtained at the end of the bifurcated stent graft implantation shows exclusion of the aneurysm and type II endoleak.

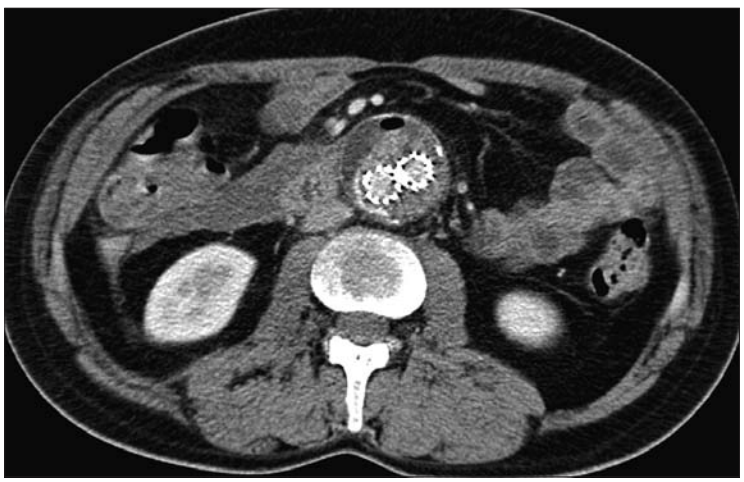

Figure 4. Postoperative contrast enhanced CT scan performed 6 days after implantation of the aortic graft showed an air bubble inside aneurysm sac and an endoleak arising from the inferior mesenteric artery (not shown). Remaining pancreatic fluid in the fascial planes is also seen.

sis of stent graft infection. Two days later, a Doppler study showed persistence of endoleak and air inside the aneurysm (Fig. 5). Control non-contrast enhanced CT scan performed on the same day showed the dimensions of the air bubble had decreased to 18 × 11 × 5 mm. Surveillance imaging at 1 month demonstrated no change in AAA size; there was no endoleak, and the air bubble had completely disappeared (Fig. 6). At 10-month follow up, the patient was asymptomatic.

Discussion

Although any vessel in continuity with a collection of pancreatic fluid may be affected, aortic complications

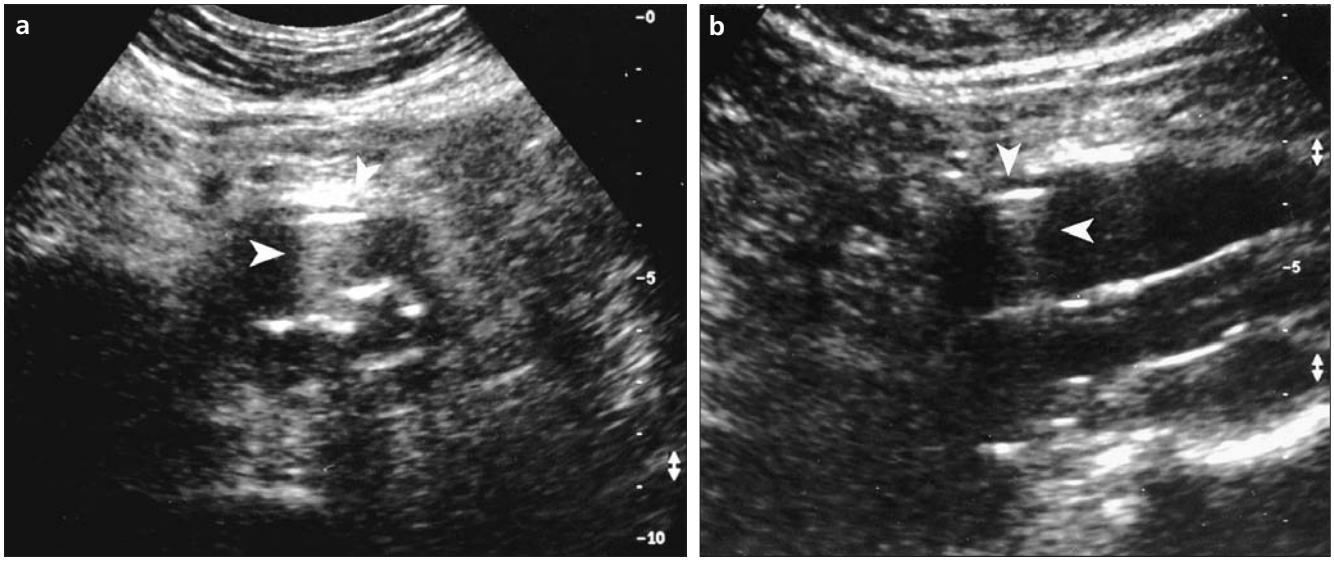

Figure 5. a, b. Gray-scale transverse **(a)** and sagittal **(b)** US images show the air inside the aneurysm sac with "dirtier" posterior acoustic shadowing *(arrowheads)*.

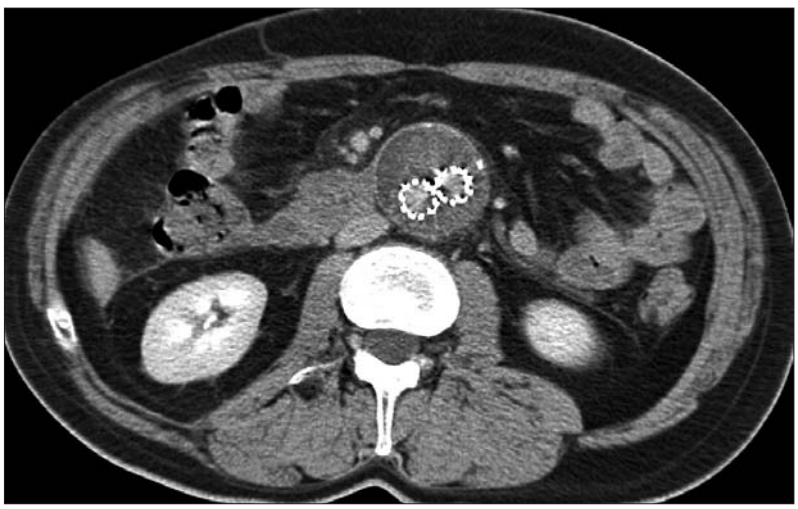

Figure 6. Contrast enhanced control CT scan one month after bifurcated endograft implantation shows total exclusion of aneurysm without endoleak and complete disappearance of air inside the aneurysm sac.

in pancreatitis, particularly those in the infrarenal region of the abdominal aorta are rare (3, 4). Endovascular aortic repair was reported to facilitate aneurysm exclusion when open surgery may be made technically difficult because of inflammatory phlegmon and infection (3).

In pancreatitis, the splenic (40%), gastroduodenal (30%), pancreaticoduodenal (20%), gastric (5%), hepatic (2%), and other (superior mesenteric, jejunal, ileocecal, aorta) (1% to 3%) arteries have been reported to be involved (5). The most plausible explanation for this is that enzymatic autodigestion associated with leakage of proteolytic enzymes, particularly trypsin and elastase, into the perivascular space lead to involvement of local arteries and veins (4, 6). It is not known why erosions of the aorta are so infrequent (4); protection from proteolytic enzymes may be involved (3). Dissection of the wall of the abdominal aorta (in the absence of aneurysm) and pseudoaneurysms have been rarely observed (3). Even though our patient had no previous radiologic evidence of AAA, we think that the aneurysm was present before the development of pancreatitis. There is no current consensus on optimal management of coexisting pancreatitis and abdominal aneurysm. We were concerned that enzymatic digestion of the aortic wall by proteolytic pancreatic enzymes in the abundant pancreatic fluid around the aneurysm could lead to the weakening of the aneurysm wall and possibly rupture of the aneurysm. Because inflammatory changes surrounding the aneurysm and abundant pancreatic fluid might be associated with a high morbidity and mortality, we preferred endovascular treatment. Using this method, the graft does not come into direct contact with pancreatic fluid, and an open surgical approach would remain an option if needed.

While the incidence of aortic graft infection has been reported to be 1%, the reports of endografts in infected areas for treatment of aortic aneurysm and/or rupture are limited (7). Abdominal CT scan is the preferred initial imaging modality (8). Perigraft fluid, perigraft soft-tissue attenuation, ectopic gas, pseudoaneurysm, focal bowel wall thickening, and hydronephrosis are among the reported radiologic signs of aortic graft infection (2). The diagnosis and presentation of infected stent grafts were reported to be substantially different from those of open repair, especially given that perfused AAA thrombus may increase the risk of secondary endovascular graft infection (8). Perigraft air is rare beyond 1 week after surgery but is not pathognomonic of graft infection until 4–7 weeks; it is considered pathognomonic for aortic graft infection after 1 month (2, 9). Although air in the aneurysm sac during the early postoperative period has been reported, we were concerned about air in the aneurysm sac in our case, de-

spite his normal white blood cell count and absence of fever, since the presentation of graft infection is often subtle and, if left untreated, uniformly fatal despite routine antibiotic prophylaxis (2, 10–12). Therefore, we closely followed the patient with frequent radiological exams. The size of the air bubble in our case on CT scan performed 6 days after implantation was 23 × 13 × 5 mm; it decreased to 18 × 11 × 5 mm in two days, and it was no longer visible on CT scan performed on postoperative day 30. Serial CT scans at 3 and 10 months showed no evidence of air or other complications in our case. We believe that air in the aneurysmal sac is an incidental postprocedural finding reflecting clinically unimportant air introduced during stent graft deployment (10, 11); and it is not necessary to perform CT scan before one-month routine control examination in the absence of other clinical signs of infection. Air inside the aneurysm sac can be detected and followed using serial US examinations. US examinations have known limitations (bowel gas, operator dependability), but have significant advantages (noninvasiveness, ease of performance, lack of radiation).

In conclusion, evidence of air trapping within the aneurysmal sac in early postprocedural period appears to be an incidental finding resulting from manipulation during stent graft deployment. It should be monitored closely, however, in patients with high risk of infection, such as with pancreatitis.

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