Aorto-Enteric Fistula after Endovascular Common Iliac Artery Aneurysm Repair: A Case Report

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Abstract
Aorto-enteric fistula (AEF) is a rare, yet severe complication following aortic aneurysm repair which requires prompt diagnosis and treatment. We report the first case of an aorto-enteric fistula (AEF) secondary to a stent-graft infection 31 months after an uncomplicated endovascular repair of a left common iliac artery aneurysm (CIAA). The various clinical presentations, along with the low sensitivity of our current diagnostic tools make diagnosis a challenging task.Suspicition of AEF should not be limited to repair of abdominal aortic aneurysms, but also common iliac artery aneurysms. A high index of suspicion along with a thorough history and physical exam is critical for making a successful diagnosis.

Keywords: Aorto-enteric fistula; Common iliac artery aneurysm; Endovascular repair; Stent-graft infection

Case Report
A 63-year-old, Hispanic male presents to the emergency department complaining of one isolated episode of hematemesis, hematochezia, and fever. His history was significant for coronary artery disease, sixty pack year smoking history and previously unpaired 31 months prior to this presentation endovascularly with a Gore graft. Two months prior to this encounter, the patient underwent a laparotomy for a retroperitoneal mass and found to have a left psoas abscess w/ surrounding necrotic bowel. The patient’s recovery was complicated by a deep vein thrombosis and was subsequently started on warfarin.

On the day of the presentation, his vital signs were stable and he was generally well appearing. His abdomen was non-distended and non-tender. Bright red stool was present in the rectal vault. The patient’s hemoglobin was 8.9 g/dL, unchanged from the patient’s baseline. A computed tomography (CT) scan of the abdomen and pelvis was performed that revealed extensive periaortic inflammation and ectopic gas within the endoluminal graft and between the abdominal aorta and the left lower abdominal small bowel loop. These findings were consistent with type 1 endoleak and a periaortic infection concerning for an aortoenteric fistula. The patient became suddenly hypotensive and tachycardic. An emergent EGD confirmed a large 1.5 cm ulcerated punched out area in the mid-3rd portion of the duodenum consistent with a fistula. Meanwhile, the patient’s anticoagulation was reversed with vitamin K and fresh frozen plasma. The patient was taken to the operating room for a laparotomy to attempt repair and control the hemorrhage. The procedure began with performing an axillary bifemoral graft. All bleeding points were controlled by cautery or clips. The AE fistula was identified with multiple leaks coming from above the renal vein down to the aorta. The specific area was very fibrosed and adherent. The bowel was resected from the fistula, however the patient became hypotensive and closed chest cardiac massage was performed. Multiple aortic clamps were placed in an attempt to control the bleeding, however during the procedure, patient developed pulse less electrical activity likely from hemorrhage shock and the patient was pronounced dead.

Discussion
Since the 1960s, the prevalence of AEFs has increased, mostly due to secondary AEFs. The incidence of primary AEF remains less than 1%, while the incidence of secondary AEF may now be as high as 1.6%. It is thought this is due to increased prevalence and repairs of aortic aneurysms [3].

Abbreviations: AEF: Aorto-Enteric Fistula; CIAA: Common Iliac Artery Aneurysm; SAEF: Secondary Aorto-Enteric Fistula; EVAR: Endovascular Aortic Repair; CT: Computed Tomography; EGD: Esophagogastroduodenoscopy; AAA: Abdominal Aortic Aneurysm.

Introduction
Secondary aorto-enteric fistula (SAEF) is a known devastating complication of open vascular repair of aortic aneurysms with the incidence at 0.36–1.6%. Meanwhile endoleaks, graft migration, aortic rupture, aortic thrombosis, endotension, and infection are more common complications [1]. However, the incidence of aorto-enteric fistulas after endovascular aneurysm repair is poorly defined with only 24 cases described since 1998. These cases were all following endovascular aortic repair (EVAR) of abdominal aortic aneurysms. Common iliac aneurysms are significantly rarer, and constitute only about 2% of all abdominal aneurysms [2]. We present the first reported case of an aorto-enteric fistula secondary to a stent-graft infection 31 months following uncomplicated endovascular repair of an isolated left common iliac artery aneurysm.
a previous aneurysmal repair as mortality approaches 100% if left untreated [5].

The diagnosis of aorto-enteric fistulas can be difficult and begins with a thorough history and physical. Various modalities have been used to aid in diagnosis, including CT, EGD, and radionucleotide scanning. However, most diagnoses are made on laparotomy. Currently, CT provides the highest sensitivity and specificity. None-theless, it is reported that CT scan confirms the diagnosis in only 33–80% of the cases [3]. EGD and colonoscopy may also be performed, although, they are most useful in excluding other causes of gastrointestinal bleeding.

Unfortunately, the diagnostic accuracy of AEF with EGD is low at 30% [6]. Traditional work up of a patient with bright red blood per rectum utilizes colonoscopy and EGD. Given the mortality of untreated AEFs and the increased sensitivity of CT, it would be reasonable to instead consider CT as the initial diagnostic test in patients who present with hematochezia or hemoptysis and a history of EVAR. An even stronger argument can be made with additional risk factors such as recent surgery and anticoagulation, as was seen in our patient.

There are multiple mechanisms which a secondary aorto-enteric fistula may develop. All mechanisms require a form of aortic or iliac reconstruction, most commonly following a graft placement. Possible causes include erosion from constant pulsating motion of the graft against the bowel wall, constant pressurization of the aneurysmal sac due to an endoleak, failure to properly suture and separate the graft from the bowel, or adhesion of an already infected and inflamed graft [7,10]. Another mechanism,
specific to post-endovascular aneurysm repair, is thought to be related to dislodgement or migration of the device due to mechanical forces [9]. There have also been cases of unknown specific mechanism, but endotension of the aneurysmal sac has been suspected [10]. Sources of graft infection include secondary bacterial seeding, perioperative contamination, aortic thrombus as a nidus, or contamination from additional procedures [8]. All cases reported thus far have been following EVAR of AAA. Our case is rare in that the fistula formed after EVAR of a solitary aneurysm of a common iliac artery. We suspect the potential mechanisms are very similar given the nature of the disease and the treatment modality.

In our case, it appears multiple factors likely played a role in fistula formation. The fistula was found at the proximal end of the endoluminal graft. Due to its location, it is possible that proximal migration of the graft, followed by constant pressurization of the aneurysmal sac against both the graft and the bowel played a large factor. Additionally, the psosas abscess and necrotic bowel found two months prior to our patient’s presentation may have caused secondary bacterial seeding of the graft, which led to endoleak and subsequent fistula formation.

Initial management of acute aorto-enteric fistula includes resection and hemodynamic support, and broad spectrum antibiotics. Once the diagnosis is confirmed, surgical management is mandatory to remove the entire prosthetic graft. The priorities of surgery include controlling the bleeding and infection, followed by revascularization [1]. Traditional treatment consists of prostatic graft excision, aortic stump suture and lower limb revascularization with extra-aortic bypass, although there is risk of aortic stump rupture. Alternative techniques include anatomical revascularization after removal of infectious tissue [12]. Broad-spectrum antibiotics are also required following surgery to prevent reinfection, which along with rebleeding, are the two most common complications of repair. The duration of antibiotic therapy is one week for negative cultures and 4-6 weeks for positive cultures with a narrowing of spectrum as indicated [11].

**Conclusion**

AEF is a rare and severe complication following endovascular aortic aneurysm repair which requires prompt diagnosis and treatment. The various clinical presentations, along with the low sensitivity of our current diagnostic tools does not make this an easy task. A strong index of suspicion is required for accurate diagnosis and treatment. This suspicion should not be limited to patients with previous repair of abdominal aortic aneurysms, but also common iliac artery aneurysms. We suggest considering CT as the initial diagnostic test and having a low threshold for emergent surgical consultation and management.

**Conflict of Interest**

The authors declare they have no conflict of interest.

**References**
