Aortoenteric fistula following endovascular abdominal aortic aneurysm repair

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ABSTRACT

Aortoenteric fistula is a rare complication after endovascular stent grafting. In the present report, we have described the case of a 69-year-old man 3 years after endovascular repair of an abdominal aortic aneurysm who had presented with worsening back pain and fever. Computed tomography had demonstrated dilated bowel and a thickened aortic wall, with air foci within the native aneurysm sac. He underwent emergent right axillary–bifemoral bypass with explantation of the aortic endograft and primary repair of the duodenal fistula. Tissue cultures grew *Streptococcus anginosus, Prevotella denticola,* and *Parvimonas micra*, and he was discharged home with 6 weeks of intravenous ceftriaxone and oral metronidazole after an 18-day hospital admission. (J Vasc Surg Cases Innov Tech 2022;8:438-40.)

Keywords: Abdominal aortic aneurysm; Endovascular procedures; Intestinal fistula; Reoperation; Vascular fistula

The development of an aortoenteric fistula is a rare, potentially life-threatening, complication that has historically been associated with open abdominal aortic reconstruction.[1] This complication has been even more infrequently encountered after endovascular abdominal aortic aneurysm repair (EVAR), with a reported incidence of 0.25% to 3.6%.[2-8] This estimate has been primarily derived from single-institution retrospective studies and case series, which might inadequately represent the true, exceedingly low, incidence of this complication. Lipsitz et al[4] reported one case of an aortoenteric fistula after 386 EVARs during an 11-year period. In another retrospective review, Hosaka et al[6] reported four cases of aortoenteric fistula of 1136 patients who had undergone EVAR in Japan during an 11-year period. One of the largest multicenter retrospective studies by Kahlberg et al[7] reported 32 cases of aortoenteric fistula after EVAR for 3932 patients across eight Italian medical centers during a 16-year period. In the present report, we have described a rare case of aortoenteric fistula after a standard infrarenal EVAR. The patient provided written informed consent for the report of his case details and imaging studies.

CASE REPORT

A 69-year-old man with a medical history of hypertension, coronary artery disease, and congestive heart failure had presented to an outside facility with worsening low back pain, weight loss, malaise, melena, and fevers. His surgical history was significant for exploratory laparotomy and right hemicolectomy 4 years prior because of numerous tubular adenomas and high-grade dysplasia. He had also undergone infrarenal EVAR 3 years earlier to treat an asymptomatic 6.3-cm abdominal aortic aneurysm. The aneurysm had been repaired using a Gore Excluder endoprosthesis (W. L. Gore & Associates, Flagstaff, AZ) and had required a 32-mm × 45-mm Gore Aortic Extender proximal extension cuff to treat a type Ia endoleak that resolved with deployment. He had been evaluated at an urgent care center for low back pain on multiple occasions in the month preceding his presentation to us. The laboratory results from those visits revealed anemia; however, no further workup had been pursued. An initial computed tomography scan had demonstrated dilated small bowel and a thickened, inflamed aortic wall with air foci within the native aneurysm sac (Fig 1). This finding was concerning for an infected endograft with a possible aortoenteric fistula, and the patient was subsequently transferred to our facility.

On arrival, the patient was hemodynamically stable with a mild leukocytosis (12.4 K/μL) and anemia with a hemoglobin level of 8.4 g/dL. Because of the patient's clinical presentation and imaging findings, he was taken to the operating room for endograft explant, repair of the duodenal fistula, and extra-anatomic bypass. The patient first underwent a right axillary–bifemoral bypass with an 8-mm polytetrafluoroethylene graft. Attention was then turned to the abdomen, where moderate adhesions were encountered from his previous right hemicolectomy. After sharp enterolysis, the small bowel was mobilized, exposing the retroperitoneum. The fourth portion of the duodenum was densely adherent to the right lateral aspect of a markedly inflamed aortic aneurysm sac. We found no evidence of a full-thickness aortic graft or barb erosion. Supraceliac

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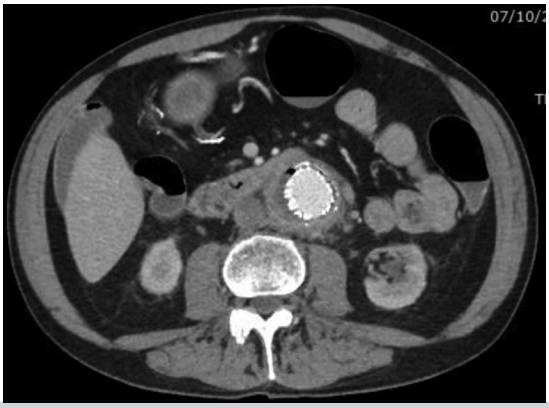

Fig 1. Contrast-enhanced computed tomography scan showing a diffusely thickened aortic wall with inflammatory changes and air foci within the native aneurysm.

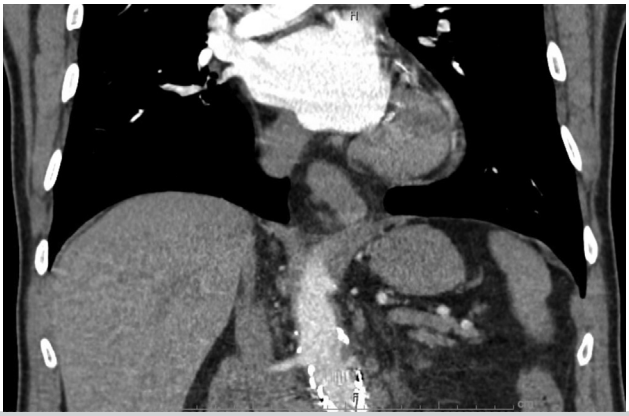

Fig 2. Contrast-enhanced computed tomography scan demonstrating the relationship of the aortic endograft with the more inferior right renal artery.

aortic control was obtained as the fistula was just 2 cm inferior to the right renal artery, and the aneurysm sac was entered via a longitudinal aortotomy (Fig 2). This revealed a focal fistulous connection between the duodenum and aorta (Fig 3). The endograft was explanted in its entirety, and the vast majority of the infrarenal abdominal aorta, including the aortoduodenal fistula, was excised. The proximal and distal aortic stumps were oversewn with running 2-0 Prolene suture, and an intraoperative consultation to general surgery was sought to perform a two-layered repair of the duodenotomy. Formal duodenal resection and reconstruction was not required as the defect was 1 cm and comprised <50% of the bowel diameter. A temporary abdominal closure device was placed in anticipation of second-look laparotomy which ultimately revealed a hemostatic surgical field with an intact duodenal repair. Omental flaps were created to provide coverage of the duodenum and aortic stumps, and the abdomen was closed.

The remainder of the patient's hospital course was complicated by repeat laparotomy on postoperative day 3 because of worsening anemia and increasing vasopressor requirements. A large hematoma was discovered and evacuated from the abdomen; however, no source of surgical bleeding was identified. An upper gastrointestinal series was performed on postoperative day 5, which demonstrated no contrast extravasation. Intraoperative tissue culture grew *Streptococcus anginosus*, *Prevotella denticola*, and *Parvimonas micra*. He was ultimately discharged home with 6 weeks of intravenous ceftriaxone and oral metronidazole after an 18-day hospital stay. At his most recent 90-day follow-up, he had continued to recover well without any gastrointestinal complaints.

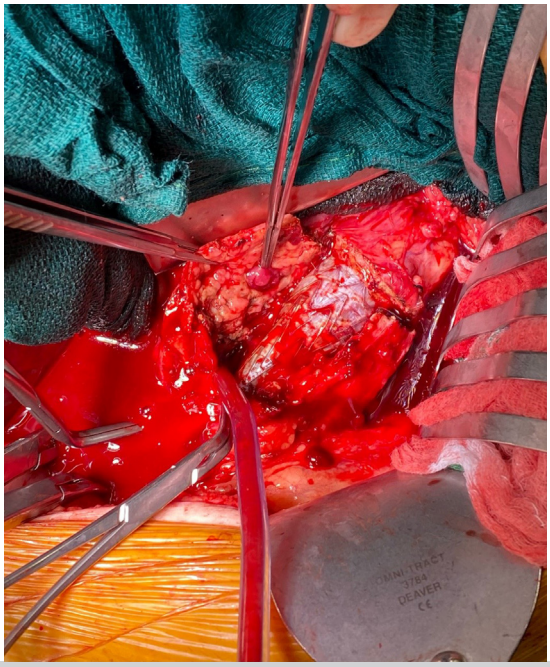

Fig 3. Aortoduodenal fistula visualized intraoperatively.

DISCUSSION

The pathogenesis of aortoenteric fistula formation after open abdominal aortic reconstruction has been theorized to occur secondary to graft protrusion, iatrogenic manipulation, and the close vicinity of the aortic and duodenal tissue. The mechanisms of fistula formation after endovascular repair have been even less well-described, because the intraluminal nature of the endograft avoids any contact with the bowel. Mechanical failure of the endograft resulting in traumatic protrusion of the stent components through the aortic wall is one mechanism by which contact with bowel can occur. Progressive aneurysmal degeneration secondary to an endoleak with resultant periaortic inflammation is another theorized etiology.

Repair of aortoenteric fistulas poses a challenging scenario for the operating surgeon. In the present case, we elected to proceed with extra-anatomic reconstruction with axillary–bifemoral bypass. One benefit to this approach before exploratory laparotomy and aortic cross-clamping is the significant reduction in the lower extremity ischemia time. This approach also avoids the

presence of an aortic anastomosis in an infected field, as this can potentially lead to complications such as anastomotic disruption, pseudoaneurysm formation, and graft reinfection. However, this might not always be a feasible option due to anatomic constraints or hemodynamic instability. Other reconstruction options include rifampin-soaked or silver-coated Dacron grafts, cryopreserved arterial homografts, and autologous reconstruction using a neoaortoiliac system technique.[9-13]

The tissue culture results comprised a unique combination of both gram-positive and gram-negative flora that normally populate the oral cavity rather than the gut microbiome, potentially suggestive of a possible dental etiology. Endografts placed during EVAR are susceptible to infection. Chaufour et al[14] reported that during a 17-year period, one third of all infected endografts had resulted in aortoenteric fistula formation. In a review of 33 cases, the frequency of gram-negative infection was 75.8%.[15] *S. anginosus* and *Prevotella* spp. have been reported previously only once in the literature.[6] To the best of our knowledge, the present case is the first known report of *P. micra* related to an aortoenteric fistula.

The incidence of aortoenteric fistulas after open repair has been reported to be ≤4.7%.[3,15,16] The development of an aortoenteric fistula after EVAR has been encountered more infrequently, with an observed incidence of 0.25% to 3.6%.[2-8] The in-hospital pooled mortality rates for patients who have undergone open or endovascular repair for aortoenteric fistula has been 30.7%.[17] The mortality rates for those patients who have not sought timely surgical management and for those for whom surgery was not a viable option are likely much higher.

CONCLUSIONS

It is important to note that not all patients with an aortoenteric fistula will present with signs of systemic infection or severe gastrointestinal bleeding, making the diagnosis challenging in the initial stages.[18-20] Early presenting symptoms of low back pain with a late presentation of weight loss, malaise, melena, and fever are common and well-described symptoms of aortoenteric fistula and endograft infection. For all patients with a history of open aneurysm repair or EVAR, suspicion for aortoenteric fistula formation must remain high, because the consequences are potentially fatal.

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