A hybrid approach to appendicitis with right external iliac artery pseudo aneurysm: A case report

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ARTICLE INFO

Article history:
Received 28 February 2017
Accepted 1 March 2017
Available online 4 March 2017

Keywords:
Myotic aneurysm
Appendicitis
Iliac artery reconstruction
Ilipsoas muscle abscess
Pseudoaneurysm

ABSTRACT

INTRODUCTION: While acute appendicitis is a common surgical problem, the simultaneous occurrence of appendicitis and an infected iliac artery pseudoaneurysm is exceedingly rare. We report the successful treatment of an infected right external iliac artery pseudo aneurysm in the setting of acute appendicitis.

PRESENTATION OF CASE: The patient is an 83-year-old male who presents with severe sepsis, right lower quadrant and right leg pain. Additional past medical history is significant for rectal cancer status post resection and radiation therapy in 1997. Computed tomography (CT) on admission revealed a right iliopsoas muscle abscess, an inflamed Appendix and a pseudo aneurysm arising from the right external iliac artery. After consultations by multiple specialties, the plan was to proceed with percutaneous drainage of the abscess, antibiotic therapy and subsequent repair of the pseudoaneurysm. CT guided drainage of the iliopsoas abscess was performed with return of hemorrhagic fluid. Due to the concern of contained pseudoaneurysm rupture, the patient was taken for expedited repair. Due to the patient’s frailty and hostile abdomen, we performed embolization of the right external iliac artery pseudoaneurysm with Amplatzer I plugs (St. Jude Medical, St. Paul MN) and left common femoral to right superficial femoral bypass with cryopreserved cadaveric femoral vein. Following pseudoaneurysm exclusion, continued percutaneous drainage and antibiotic therapy, the patient has done well with no further evidence of infection.

CONCLUSION: Repair of infected pseudo aneurysms can prove challenging. Ongoing infection, a hostile surgical abdomen and patient frailty further complicates the treatment of these patients. This case displays a minimally invasive approach to this rare but morbid condition.

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1. Introduction

Although acute appendicitis is the most common surgical condition of the abdomen, its diagnosis and management continues to challenge surgeons [1]. While appendectomy is the only therapeutic option in uncomplicated acute appendicitis, a non-operative approach is generally preferred in cases complicated by abscess formation [2]. Vascular complications arising from appendicitis are extremely rare [3–8]. Infected pseudoaneurysms are also rare and generally are associated with a poor prognosis due to the advanced age and comorbidities of these patients [9]. Delayed diagnosis and treatment of infected aneurysms usually results in sepsis, arterial rupture and death [10]. We report here the successful treatment of a ruptured infected right external iliac artery pseudoaneurysm (PSA) in the setting of complicated acute appendicitis.

2. Presentation of case

The patient is an 83-year-old male who presents with a several day history of altered mental status, anorexia, weakness, fever, rigors and 3 weeks right anterior thigh and right lower quadrant abdominal pain. Additional past medical history is significant for a history of rectal cancer status post-surgical resection and radiation therapy in 1997, diabetes mellitus and benign prostatic hypertrophy. Upon presentation, his vital signs were notable for a temperature of 38.9 Celsius, tachycardia (131 beats per minute) and hypotension (97/61 mmHg). His physical examination revealed mild right lower quadrant tenderness. Abnormal Laboratory values included a white blood cell count of 17K/μL, serum creatinine of 1.9 mg/dL and lactic acid of 6.2 mmol/L. Initial work-up included blood and urine cultures, fluid resuscitation, broad spectrum antibiotics and imaging with computed tomography (CT). CT imaging revealed a right iliopsoas abscess measuring 7 × 5 × 4 cm (Fig. 1A), a distended and hyperemic Appendix along with a pseudo aneurysm arising from the lateral wall of the right external iliac artery measuring 9 × 7 mm (Fig. 1B). Additionally, infection is seen tracking into the right groin (Fig. 1C). After consultations by vascular surgery, general surgery, infectious diseases and interventional radiology,
the plan was to proceed with percutaneous drainage of the abscess, antibiotic therapy and subsequent repair of the pseudoaneurysm. Under conscious sedation and CT guidance, a 12 French × 25 cm Dawson-Mueller Drainage Catheter (Cook Medical, Bloomington, IN) was inserted into the right iliopsoas collection (Fig. 2A & B). After connecting the catheter to a drainage bag, there was return of a large amount of dark hemorrhagic fluid. Due to the concern of that this fluid may represent contained rupture of the iliac artery pseudoaneurysm, the patient was taken for expedited surgical repair. Due to the patient’s frailty and hostile abdomen, we elected to perform a minimally invasive hybrid repair. Under general anesthesia, we surgically exposed the left common femoral artery and right superficial femoral artery. Due to infection tracking into the right groin and adjacent to right common femoral artery (Fig. 1C), we intentionally chose to expose the more distal superficial femoral artery. Next, we accessed the right superficial femoral artery and placed a 6 French sheath. Digital subtraction angiography (DSA) was used to confirm the location of the right external iliac artery pseudoaneurysm (Fig. 3A). We then performed embolization of the right external iliac artery pseudoaneurysm with two 12 mm Amplatzer I plugs (St. Jude Medical, St. Paul, MN) (Fig. 3B) placed proximally and distally to the pseudoaneurysm. Subsequent extra-anatomic revascularization consisted of a left common femoral artery to right superficial femoral artery bypass performed with cryopreserved cadaveric femoral vein. Follow-up angiography and volume rendered images demonstrate the unconventional graft tunnel (Fig. 4A & B) need to avoid the infectious fluid in the right groin. Microbiology from the CT guided drainage demonstrated Stretococcus anginosus, Candida Albicans and Candida Dublinesis. Following continued catheter drainage and prolonged antibiotic therapy (ertapenem and fluconazole), the patient’s intra-abdominal infection resolved (Fig. 5A–C). One year following surgery, the patient is doing well with a patent bypass graft and without evidence of recurrent infection.

**Fig. 1.** Pre-operative axial images from computed tomography demonstrating (A) a right iliopsoas abscess measuring 7 × 5 × 4 cm, (B) a distended and hyperemic Appendix along with a pseudo aneurysm arising from the lateral wall of the right external iliac artery measuring 9 × 7 mm. Additionally, (C) infection is seen tracking into the right groin precluding the right common femoral artery as a site for distal revascularization.

**Fig. 2.** Successful computed tomography guided drainage (A) and placement of 12 French Dawson Mueller tube (B) in right iliopsoas abscess with immediate return of hemorrhagic fluid concerning for contained rupture of right external iliac pseudo aneurysm.

**Fig. 3.** Digital subtraction angiography (DSA) demonstrating a right external iliac artery pseudo aneurysm pre- and post-embolization, respectively (A & B).

**Fig. 4.** Digital subtraction angiography (A) and three-dimensional volume-rendered images (B) demonstrating successful embolization of the right external iliac artery pseudoaneurysm with Amplatzer I plugs (St. Jude Medical, St. Paul MN) and left common femoral to right superficial femoral bypass with cryopreserved cadaveric vein.

**Fig. 5.** Post-operative axial images from computed tomography demonstrating a nearly resolved right iliopsoas abscess and successful exclusion of infected right external iliac artery pseudoaneurysm (A–C).
3. Discussion

Cases of an infected external iliac artery aneurysm secondary to appendicitis are uncommon and those presenting with rupture are even more rare. Polat et al. [5] reported a 27-year-old female renal transplant patient who initially underwent abdominal exploration for allograft failure. She was explored for presumed renal vein thrombosis but was found to have concomitant appendicitis. Her index surgery consisted of an open appendectomy and transplant nephrectomy. Two weeks later, she returned with abdominal tenderness and hypotension. Imaging confirmed a ruptured right external iliac artery pseudoaneurysm and she underwent open surgical resection and cross femoral bypass with a polytetrafluoroethylene graft. Intraoperative cultures revealed *Candida albicans* for which she underwent prolonged treatment with intravenous fluconazole. An additional case was reported by Hsu et al. [4] who described a healthy 64-year-old male with acute appendicitis and 2.8 cm infected left common iliac artery pseudoaneurysm. In contrast to the first case, this patient was treated with 14 days of intravenous antibiotics followed by percutaneous stent placement to exclude the pseudo aneurysm. Microbiology information and antibiotic selection were not detailed in this publication. While both of these case reports demonstrate an immediate successful result, they lack any long term follow-up. In contrast, our patient remains infection free at one-year post-surgery. Furthermore, we believe that our case is unique in that it combines both minimally invasive techniques (i.e. endovascular arterial exclusion with Amplatzer plugs and CT guided drainage), more traditional surgical techniques (i.e. extra-anatomic bypass with cadaveric vein) and medical management (i.e. prolonged intravenous antibiotics) to achieve a successful outcome in a medically infirm patient.

4. Conclusion

Repair of infected pseudo aneurysms can prove challenging. Ongoing infection, a hostile surgical abdomen and patient frailty further complicates the treatment of these patients. This case displays a minimally invasive approach to this rare but morbid condition.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflicts of interest

None.

Consent

Written and signed consent was obtained from the patient.

Author contributions

BTC & BMK – data analysis and interpretation, writing the paper

EJR – overall responsibility, data analysis and interpretation, writing the paper

JRE – data analysis and interpretation, writing the paper.

Guarantor

EJR.

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