Mycotic Renal Artery Aneurysm Repair with a Covered Stent

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Mycotic renal artery aneurysms are rarely seen. Because the renal artery is located deep within the retroperitoneum, open surgical repair is highly invasive. Endovascular repair with a covered stent, followed by an adequate antibiotic regimen, may offer a treatment alternative for elderly and emaciated patients. We report the first case of using a covered stent in treating a mycotic renal artery aneurysm. The 82-year-old male was sent to our hospital due to abdominal pain and fever, and computed tomography (CT) scan preliminarily indicated a retroperitoneal abscess at the right renal hilum. After a CT-guided aspiration, which revealed fresh blood, a mycotic aneurysm of the right renal artery was then diagnosed. Retroperitoneal bleeding was successfully curtailed with a 6 × 60 mm covered stent. Blood cultures were negative. Empirical intravenous antibiotics to prevent Salmonella were administered. Four weeks later, the patient was discharged without any symptom or sign of infection, and no infection recurrence was noted in the following 11 months.

Key Words: Endografting • Mycotic aneurysm • Renal artery • Stent graft

INTRODUCTION

Mycotic renal artery aneurysm is rarely seen, with only a few case reports found in the literature.1,2 As a result, there is no recommended treatment strategy for this disease. Open surgical grafting with debridement might offer a cure. However, the deep location of the artery and adhesions around the aneurysm make the operation very difficult, either transperitoneally or retroperitoneally. In recent years, endovascular measures were gaining popularity as treatment for various vascular diseases. Even in complex scenarios, such as a ruptured bilateral iliac artery aneurysm, a stent graft could seal the bleeding in a short time frame.3 Previously, there was no reported case involving stent graft use in a case with mycotic renal artery aneurysm. Herein, we report our experience.

CASE REPORT

An 82-year-old male was sent to our emergency department complaining of abdominal pain for one day. He had underlying hypertension, benign prostate hyperplasia, and diagnosed gall bladder stones post-cholecystectomy ten years ago. A fever as high as 38.2 °C was also noted. Initial laboratory examination showed: leukocytosis (white blood cell count of 12,630/µl with 78.5% neutrophils); hemoglobin at 13 g/dl; normal renal function (blood urea nitrogen of 21 mg/dl); creatinine of 1.2 mg/dl; without liver enzyme elevation (alanine transaminase of 17 IU/L). Abdominal computed tomography (CT) revealed a 3.2 cm × 1.9 cm space-occupying lesion behind inferior vena cava and the left renal vein. (Figure 1A, arrow). Further septic work-ups, including echocardiography to exclude the possibility of infective...
endocarditis, did not disclose any other obvious focus of infection. Thus, the lesion was considered as a retroperitoneal abscess. Intravenous flomoxef sodium, a third-generation cephalosporin, was initiated. However, fever and abdominal pain persisted. Blood cultures remained negative after 3 days. The patient became more and more agitated with unstable blood pressure readings. Consequently, CT-guided aspiration and drainage of the “abscess” were arranged, due to the impression of possible uncontrolled infection probably due to resistant pathogen.

CT-guided aspiration was performed on the third day after admission. Without contrast enhancement, the involved area of the lesion in the retroperitoneal space was noted to be expanding (Figure 1B, arrow). Needle aspiration drew out fresh blood. Because of the rapidly-evolving nature of the situation, with our patient also suffering from fever and leukocytosis, a mycotic aneurysm with retroperitoneal hemorrhage was diagnosed. In order to prevent bleeding, platinum coils were used to seal the puncture tract. Hemoglobin was re-checked immediately. The level of hemoglobin was 9.7 g/dl, while the level at admission was 13 g/dl. A cardiovascular surgeon was consulted, and because the patient was old, with unstable hemodynamics, we planned to stop the retroperitoneal bleeding as soon as possible with a covered stent.

Under general anesthesia with full surgical preparation, we used the mobile C-arm system (OEC 9800, GE Medical Systems, Salt Lake City, UT, USA) for the procedure. Initial systolic blood pressure was around 80 mmHg. A right inguinal puncture was made with an 8 Fr introducer sheath. Right renal artery was engaged with a 4 Fr Judkins right catheter. Angiography was performed and revealed an expanding mycotic aneurysm, originating from the proximal right renal artery, which was 1 cm from the aorta. In the early arterial phase, a 3 × 2 cm aneurysm was clearly demonstrated (Figure 2A). In the late phase, the contrast medium flowed to an even larger space with coils inside, the space reached by the radiologist during the earlier percutaneous aspiration (Figure 2B). A 0.035” hydrophilic wire (Terumo, Japan) went through the right renal artery as distal as possible. The 4 Fr Judkins right catheter was advanced along the wire for exchanging with a 0.035” stiff wire (Terumo, Japan). A 6 × 60 mm fluency covered stent (BARD Peripheral Vascular, Tempe, AZ, USA) was deployed, with a 0.5 cm protrusion into the abdominal aorta (Figure 2C). Systolic blood pressure rose 140 mmHg gradually after sealing of the bleeding was complete.

Because Salmonella is the most common cause of mycotic aneurysm in Taiwan,4,5 Ceftriaxone (2 g every 12 hours) was prescribed. The patient’s fever subsided on post-stenting day three. Follow-up CT on post-stenting day seven showed no contrast leakage, and gradual resolution of the retroperitoneal hematoma (Figure 1C, arrow). No abscess formation was detected. After completion of a 28-day course of intravenous antibiotics, the patient was discharged in stable condition. There was no recurrence of infection in the subsequent three months.

DISCUSSION

Because no obvious contrast leakage was seen in the initial CT, the initial diagnosis of “retroperitoneal abscess” was made in the beginning. Based on this impression, septic shock was suspected and CT-guided aspiration was attempted. However, expanding circular lesions and blurred soft tissue plane, which were seen on the CT immediately before aspiration (Figure 1B), gave us a clue to change the diagnosis to “mycotic aneurysm”. At this stage, the aspiration procedure should be withheld. A Doppler ultrasound examination and decreased hemoglobin level would give us the correct assessment. This markedly decreased hemoglobin level would also account for the patient’s shock, which was likely hypovolemic in nature. Blood pressure also stabilized after the bleeding was sealed with a stent graft.

In terms of mycotic aneurysms, open surgery is the best way to address the problems of bleeding and infection. However, surgery is highly invasive. Deeply located arteries and also dense adhesions around the aneurysms make the operation extremely difficult. In a 90 patient series, visceral artery aneurysms and pseudoaneurysms, involving the celiac, superior mesenteric, and inferior mesenteric arteries, could be treated with an endovascular approach, with low morbidity.6 Coil embolization was used in 96% of the patients in that series. Mycotic renal artery aneurysm was extremely rare compared with visceral ones (visceral artery aneurysms).
There was no large case series reported in the literature. Some previous case reports indicated mycotic renal artery aneurysm as a complication of bacterial endocarditis.\textsuperscript{1,2} However, the location of the aneurysms in most reported cases were in distal intra-kidney segments, in which embolization was feasible. Embolization was less suitable in our scenario because the patient

\textbf{Figure 1.} A 3.2 $\times$ 1.9 cm space-occupying mass (arrow) was found behind inferior vena cava and the left renal vein at the level of the superior mesenteric artery takeoff. (B) Three days later, while performing computed tomography (CT)-guided aspiration, the space-occupying lesion expanded posteriolaterally, compared with (A), with a much more blurred soft tissue plane (arrow). (C) Follow-up CT showed no contrast leakage and no abscess formation (arrow).

\textbf{Figure 2.} In the early arterial phase, a 3 $\times$ 2 cm pseudoaneurysm was clearly demonstrated, originating from the proximal renal artery. (B) In the late phase, delay contrast medium clear off at an even larger space with coils inside, which was the one that the radiologist reached during CT-guided aspiration. (C) A 6 $\times$ 60 mm Fluency-covered stent was deployed, with a 0.5 cm protrusion into the abdominal aorta. No more contrast leakage was noted.
might lose an entire kidney. Actually, a “pseudoaneurysm” was an “extra-vascular” lesion. A large number of coils might be needed to induce thrombosis in this sizeable space, which could be time-consuming and cost prohibitive. Furthermore, the infectious tissue was also fragile. A new perforation on the infected renal artery might occur before adequate control of the infection by antibiotics. Therefore, we decided that a stent graft would be a good choice, which could seal the bleeding and preserve right renal perfusion. A stent graft also had the advantage of “bridging from healthy part to healthy part,” so we chose a longer one (6 cm) for this purpose.

Endografting of the renal artery is frequently carried out in combination with a branched aortic endografting procedure.\(^7\) In our case, from a technical point of view, it was not difficult to deploy a stent graft in the renal artery. The uncertain issue was whether or not we could eradicate the infection of the renal artery by medical therapy. Once again, we were not able to find any previous study as our reference. However, while we looked at the data derived from endografting in mycotic aortic aneurysms, we noted that it was possible to cure infection of the aorta with endografting and antibiotics.\(^8\) Our patient had all three of the major risk factors for persistent infection: ≥ 65 years of age, rupture of the aneurysm, and fever at the time of operation. All told, these factors strongly suggested we move forward with great caution, due to the patient’s substantial risk for persistent infection. This was why we followed this patient with computed tomography in order to early detect aggravating infection. If the fever subsided, this could also could be considered a sign that the infection did not persist. In our opinion, however, if the infection did persist, and we had to perform percutaneous drainage or surgical debridement after endografting, it would be much safer and easier than an open surgical repair of right renal artery. We did not have to worry about massive bleeding while doing surgical dissection. The strategy of “endografting followed by debridement” had been reported to be feasible in infected anastomotic femoral pseudoaneurysm.\(^9\) We believed the same principle could be applied to our patient. Fortunately, the infection of our patient was eradicated solely by intravenous antibiotics, and did not require a drainage or surgical debridement procedure.

In conclusion, for those patients that are old and emaciated patients, less invasive alternatives should always be taken into a physician’s consideration. In our particular case, endografting with antibiotic treatment was an acceptable way to treat a mycotic renal artery aneurysm.

REFERENCES