

Mycotic Aortic Aneurysm: Review of the Literature and Report of Two Cases

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ABSTRACT

A mycotic aortic aneurysm (MAA), synonymously known as infected aortic aneurysm, is an aortic aneurysm due to infection. Mycotic aortic aneurysm most commonly develops through microbial inoculation of the diseased aortic endothelium during bacteremia. In this study we presented 2 Mycotic aortic aneurysm cases. In the first case the patient is a 50-year-old farmer who presented with a complaint of abdominal pain. The patient was consulted with the vascular surgery service for the diagnosis of ruptured abdominal aneurysm. The patient was prepared for surgery of a ruptured abdominal aortic aneurysm. After surgery, the patient's blood culture was reported negative after 72 hours, but the patient's aneurysm sac tissue culture reported *Citrobacter freundii*. The patient's antibiotic treatment regimen was changed according to the performed antibiogram. In another case A 65 year's old male who was admitted in neurology ward was consulted with us, because of a pulsatile abdominal mass. The patient had Alzheimer disease and Brucellosis and didn't receive a complete duration treatment for his Brucellosis. On surgery, we bypassed the defect and covered the graft with peritoneum. In first case the patient's blood culture was reported negative after 72 hours, but the patient's aneurysm sac tissue culture reported *Citrobacter freundii*. The patient's antibiotic treatment regimen was changed according to the performed antibiogram. In second case he was discharged without any surgical complication and on follow -up visit (7 months later) he didn't have any complaint.

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Introduction

Between 0.7% and 2.6% of all aortic aneurysm cases are mycotic (1). It is associated with higher mortality than degenerative aortic aneurysm, and all

untreated patients are deceased. Generally, most of the literature concerns the treatment of mycotic aortic aneurysms rather than diagnostic processes (2, 3). We present two cases of mycotic aortic aneurysm in this article.

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Case1

The patient is a 50-year-old farmer who presented with a complaint of abdominal pain. The patient's abdominal pain had started suddenly in the left lower quadrant (LLQ) area 4 days before the visit. The patient's pain was severely progressive and he had no history of gastrointestinal symptoms. During this time, the patient was referred to various physicians and underwent conservative treatment, but he did not respond to treatment. Finally, the patient was referred to a hospital in the center of the province with a sudden increase in of in his abdominal pain. and in its area. During the initial examination, a double contrast computed tomography scan (CT scan) was performed from the abdomen and pelvis, which showed an abdominal aortic aneurysm with retroperitoneal hematoma. Finally, the patient was consulted with the vascular surgery service for the diagnosis of ruptured abdominal aneurysm. At the time of our visit, the patient was conscious but appeared to be pale, complaining of abdominal pain in the LLQ and periumbilical area, which radiated to the back and was persistent in nature. He did not have a history of gastrointestinal symptoms and his past-medical history was negative except for a history of coronary balloon angioplasty 3years ago. On physical examination, the patient had fever and his body temperature was 39 centigrade, his heart rate was 88 bpm and blood pressure was 110/90 mmhg. The abdomen was asymmetrical in appearance and a marked swelling on the left side of the abdomen was visible, which was tender to palpation and dull in the percussion. After performing the initial procedures and blood cross-match, the patient was prepared for surgery of a ruptured abdominal aortic aneurysm. The abdomen was opened by midline incision from the xiphoid to the symphysis pubis, and in the initial evaluation a pulseless stiff bulging, extending beyond the transverse meso-colon, was seen in retroperitoneum with increased peritoneal thickness and lack of suitable landmarks for tissue dissection around the aorta. Therefore, the supra- celiac aorta was explored, and after controlling it, the supra-celiac aorta was clamped and the duration of the clamp was

recorded, and then we opened the hematoma area. Large amounts of clots were removed from the area and then a ruptured saccular aneurysm sac was seen. Pre-aortic tissues had adhesions and increased thickness. Then the infra-renal section of the aortic was explored and after its clamping, the supra-celiac clamp was released. After the clamping the distal aorta, the aneurysm sac was opened. The aneurysm was free of clots. After ligation of lumbar branches and the inferior mesenteric artery (IMA) examination for black flow status, the sac was removed and sent for tissue culture. In the study of the area, we had no evidence of an active infectious process. Therefore, we repaired the aorta with a 16 mm Dacron tubular graft. After the operation, due to the anemic nature of the patient and the presence of a large retroperitoneal hematoma, the fascia of the abdominal wall was left open and just the skin was repaired. The patient was transferred to the Intensive care unit (ICU) and extubated on the first day of Postoperative (POD). On the second day, On examination, the left common femoral pulse as well as the distal pulses of the left lower limb were not palpable but the limb was warm and did not show severe acute ischemic changes, while the opposite limb pulses were palpable and we did not have a pathological examination. Therefore, the patient underwent embolectomy and after that, the patient underwent another operation to repair the abdominal fascia. Also, due to the diagnosis of a saccular infectious aneurysm for the patient, empiric antibiotic therapy with ciprofloxacin and clindamycin was started and blood culture samples were sent before they had been started. An incidental finding from preoperative time was the presence of a pleural effusion on the left side of the chest that did not cause respiratory distress. On the second post-operative day, the patient developed respiratory distress, and after sampling of the pleural fluid, a chest tube was inserted to drain fluid. The pleural fluid sample was exudative and high in protein and in biochemical examination, neutrophils and RBC were abundant with 252 mg/dl sugar, which was mostly diagnosed as a para-pneumonic pleural effusion. The patient's blood culture was reported negative after 72 hours, but the patient's aneurysm sac

tissue culture reported *Citrobacter freundii*. The patient's antibiotic treatment regimen was changed according to the performed antibiogram, Figure 1(A) shows CT Angiography patient1. Figure 2(A, B) shows surgery of mycotic aortic aneurysm. Figure 4(A) shows hematoxylin and eosin staining pathology for aortic aneurysm confirmation.

Case2

A 65 years old male who was admitted in neurology ward was consulted with us,

because of a pulsatile abdominal mass. The patient had Alzheimer disease and Brucellosis and didn't receive a complete duration treatment for his *Brucella melitensis*.

The patient was transferred to our vascular surgery ward and prepared for open surgery. We started Brucellosis treatment but as it was a Pseudoaneurysm we couldn't wait for a full course of treatment.

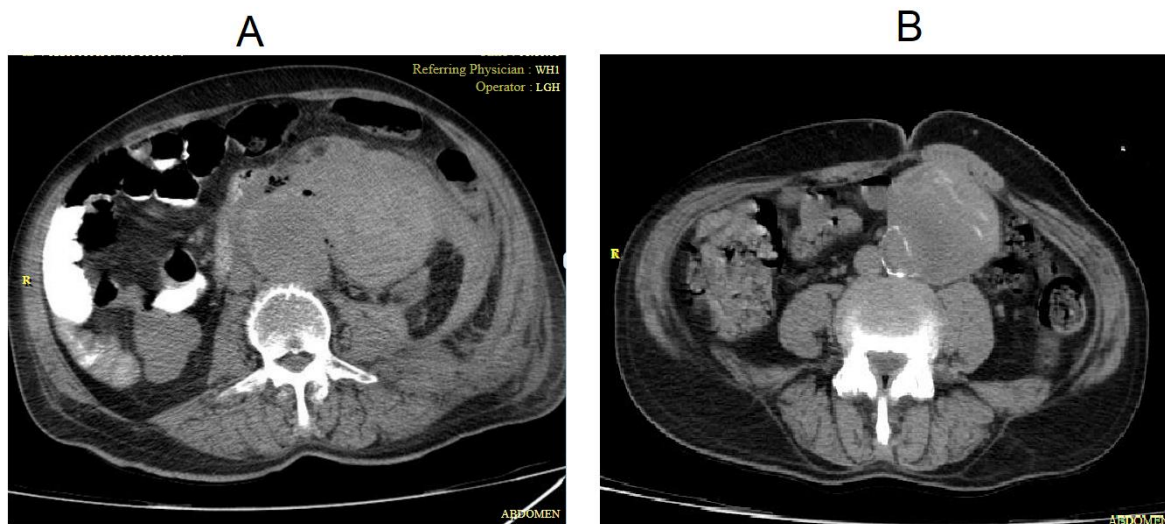


Figure 1: CT Angiography, A; patient 1, B; patient 2.

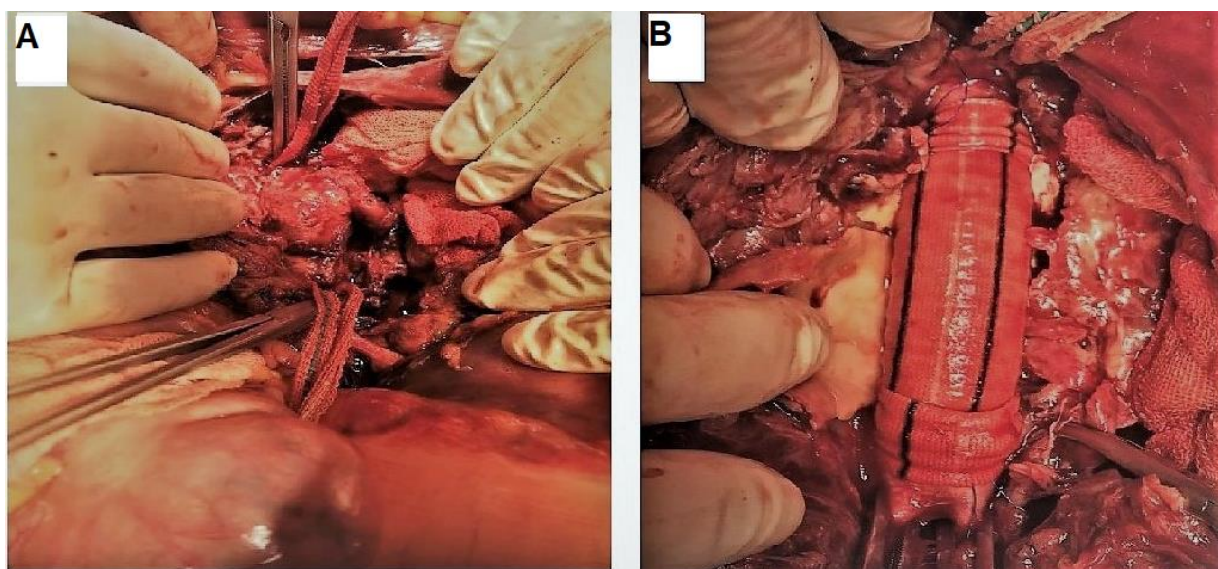


Figure 2: Case1, A : Opened Saccular aneurysm, B: Completed graft replacement of saccular aneurysm.

Echocardiography shows that EF=55%. His EF=55%. His ESR=120. He was prepared for open surgery. On surgery, after opening the abdominal wall there was a large pulsatile saccular aortic aneurysm located about 21 cm below renal arteries. After getting proximal control of intrarenal aorta and distal control from common iliac arteries and hepatizing the patient we clamped the aorta and iliac arteries and opened the aneurysm. We evacuated the clots and saw a 20 mm defect in anterior wall of aorta. We bypassed the defect and covered the graft with peritoneum. The patient was transferred to ICU and after two days ICU stay, he was transferred to the ward. He was discharged without any surgical complication and on follow -up visit (7 months later) he didn't have any complaint

Figure 1(B) shows CT Angiography patient2. Figure 3(A, B, C) shows surgery of mycotic aortic aneurysm. Figure 4(B) shows hematoxylin and eosin staining pathology for aortic aneurysm confirmation.

Discussion

Saccular aortic aneurysms that are asymptomatic and have a diameter <45 mm can be managed conservatively. Conservative therapy includes controlling the blood pressure (<130/80), treating the medical conditions that are accompanied with aneurysm, serial imaging annually or biannually. The threshold diameter which saccular aneurysms are treated is smaller than fusiform aneurysms (4).

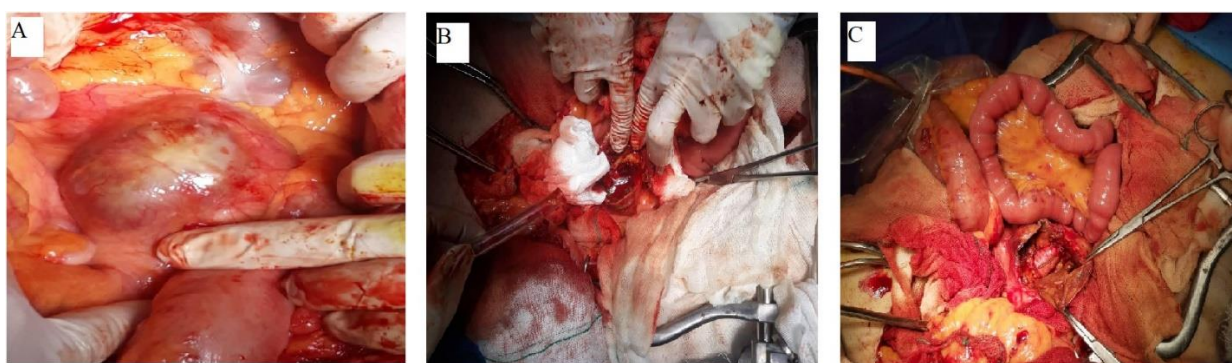


Figure 3: Case 2, A : Saccular aortic aneurysm, B: Opened aneurysm, C: Completed graft interposition of saccular aneurysm.

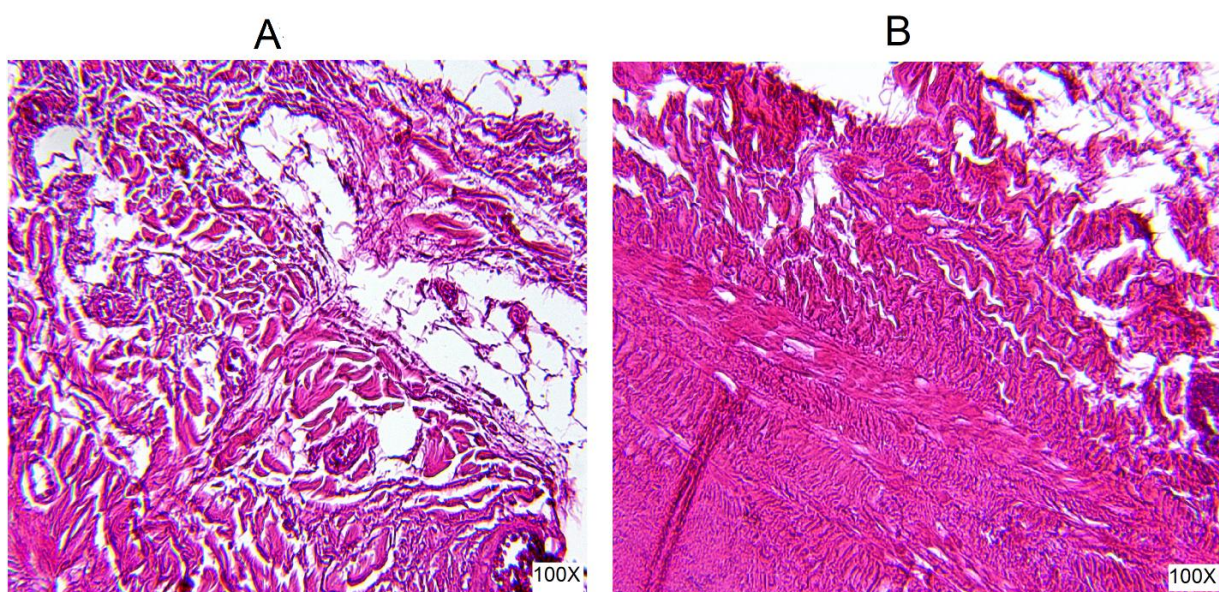


Figure 4: hematoxylin and eosin staining pathology for aortic aneurysm confirmation, Case1, A and Case 2, B: medial layer degeneration.

Open surgical repair has been defined as the gold standard treatment modality for Mycotic Abdominal Aortoiliac Aneurysm by the European Society for Vascular Surgery (ESVS) 2019 Clinical Practice Guidelines on the Management of Abdominal Aorto-iliac Artery Aneurysms (Class IIa, Level of Evidence C). There are different surgical techniques for MAA repair: in situ and extra-anatomic bypass, prosthetic graft revascularization. Due to a higher complication rate for extra-anatomic bypass, in situ revascularization has been suggested as the preferred treatment modality (5). The ideal prosthesis choice is controversial. Due to the reduction of the prosthetic graft infection risk, rifampin-soaked prostheses have been used in the majority of patients. The preferred surgical technique depends on the location of MA and infection severity (6). When there is severe purulent collection, the extra-anatomic technique is preferred. EAR complications include stump rupture and graft thrombosis (7). The fundamentals of MAAIA treatment are as follows: infection eradication, aggressive surgical debridement of infected tissues, reconstruction of the artery and postoperative antibiotic therapy (8). Treatment results are depending on the immunological status of the patient and his/her cardiovascular condition and the source of infection (9).

European Society for Vascular Surgery (ESVS) 2019 Clinical Practice Guidelines on the Management of Abdominal Aortoiliac Artery Aneurysms defined the open surgical repair as the gold standard for definitive treatment of (mycotic aneurysms of the abdominal aorta and iliac arteries) MAAIA, with endovascular treatment of abdominal aortic aneurysms (EVAR) being an acceptable alternative to open surgical repair (OSR) (Class IIa, Level of Evidence C) (10).

Principles of Surgery for mycotic aneurysms should be wide debridement of infected tissue, obtaining tissue specimen for gram stain and culture, irrigation of surgical field with antiseptic fluid, revascularization and postoperative antibiotic therapy (11).

There are concerns regarding stent-graft repair of infected aortic aneurysms. Recently published studies have shown that although there endovascular repair has short-term advantages over open surgery there are no

differences between open and endovascular repair of mycotic aneurysm in the long term (12).

Endovascular repair complications are common and fatal. As reinfection and sepsis have high mortality, endovascular repair should be selected with caution and it is not suitable for patients who are good candidates for open repair of the mycotic aneurysm (13-15).

Conclusion

As MAAIAs are complex and rare pathologies, there is no standardized treatment modality and it needs a multidisciplinary approach in addition to antibiotic therapy. A safe approach is open surgical repair and prolonged antibiotic therapy. Surgery should consist of complete debridement of infected tissue. However there are still many controversies that halt us from finding a standardized treatment approach.

Conflicts of interest

There are any potential conflicts of interest within the manuscript.

Informed consent

Informed consent has been obtained from each patients for publication of the case report and accompanying images.

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