

Mycotic Aortic Aneurysm Caused by Multidrug-Resistant Enterobacteriaceae in an Elderly Patient: A Diagnostic Challenge

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ABSTRACT

We report the case of an 86-year-old patient with a complex urological history who presented with fever and generalized weakness. Bloodstream infection was documented and initially attributed to a urinary source, based on the presence of urolithiasis and a positive urine culture for multidrug-resistant Enterobacteriaceae. Targeted antibiotic therapy was therefore initiated.

However, the patient showed persistent fever and sustained elevation of inflammatory markers despite appropriate antimicrobial treatment. Computed tomography subsequently revealed a saccular aneurysm of the abdominal aorta, which was further confirmed as a mycotic aneurysm by positron emission tomography. Given the patient's advanced age and frailty, a conservative management strategy with prolonged antibiotic therapy was selected. The patient showed a favorable clinical outcome.

Keywords: aortic aneurysm, aneurysm infected, Enterobacteriaceae, aged, bacteremia, frailty.

Aneurisma aórtico micótico por enterobacterias multirresistentes en paciente anciano: desafío diagnóstico

RESUMEN

Se presenta el caso de un paciente de 86 años con antecedente de vía urinaria instrumentada que consultó por fiebre y debilidad generalizada. Se documentó bacteriemia, inicialmente interpretada como foco urinario por evidencia de litiasis y urocultivo positivo con enterobacterias multirresistentes, y se inició tratamiento antibiótico dirigido. Durante la evolución presentó persistencia de fiebre y marcadores inflamatorios elevados pese a tratamiento terapéutico adecuado. Por tomografía computarizada se evidenció un aneurisma sacular de la aorta abdominal, confirmado como aneurisma micótico mediante tomografía con emisión de positrones. Dada la edad avanzada y la fragilidad del paciente, se optó por un manejo conservador con antibioticoterapia prolongada. El paciente presentó una evolución clínica favorable.

Palabras clave: aneurisma de la aorta, aneurisma infectado, Enterobacteriaceae, anciano, bacteriemia, fragilidad.

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INTRODUCTION

Mycotic aortic aneurysms are infectious dilatations of the aortic wall and are uncommon, accounting for approximately 0.7% to 4.5% of all aortic aneurysms. Despite their low incidence, they are associated with high morbidity and mortality because of diagnostic challenges and the risk of severe complications, including sepsis, aneurysm rupture, and involvement of adjacent structures¹.

The term “mycotic” originated from the gross appearance of these lesions and does not necessarily imply a fungal etiology. Most cases are bacterial in origin. The most commonly implicated microorganisms include *Salmonella* species, *Staphylococcus aureus*, and *Streptococcus* species, whereas *Enterobacteriaceae* are less common causative pathogens².

Diagnosis relies on integrating clinical, microbiological, and imaging findings. Clinical manifestations typically include fever of unknown origin (present in about 70% of cases) and pain, depending on the aneurysm location^{3,4}. Laboratory findings usually include elevated acute-phase reactants. Contrast-enhanced computed tomography (CT) is the preferred initial imaging modality for assessing vascular morphology and arterial wall abnormalities, whereas positron emission tomography combined with computed tomography (PET/CT) increases diagnostic certainty by detecting active inflammation of the vascular wall⁴⁻⁶.

Standard treatment consists of surgical resection combined with targeted antibiotic therapy. Endovascular techniques offer an alternative in selected cases, whereas medical management alone is reserved for patients at high surgical risk or those for whom surgery is not feasible^{7,8}.

We present this case because of its unusual combination of multidrug-resistant *Enterobacteriaceae* infection, diagnostic confirmation by PET/CT, and exclusive medical management in a frail older patient.

CASE PRESENTATION

An 86-year-old man presented with a four-day history of generalized weakness and chills during the preceding 48 hours.

His medical history included multiple urologic surgeries for urethral stricture. Six months before presentation, he had undergone urethral reconstruction with a flap, complicated by a distal urethral fistula requiring suprapubic catheter placement.

On admission, he was alert, in good general condition, and febrile (38 °C), with stable vital signs. Laboratory tests showed a white blood cell count of 10,900/mm³ with neutrophilia, a creatinine level of 1.33 mg/dL (previously 0.9 mg/dL), a blood urea level of 69 mg/dL, and a C-reactive protein level of 230 mg/L. Arterial blood gas analysis revealed metabolic acidosis with a lactate level of 6.2 mmol/L. Urinalysis showed pyuria, hematuria, and abundant bacteria. Renal ultrasonography ruled out urinary calculi, abscesses, and renal collecting system dilation. Given the elevated acute-phase reactants, newly

developed renal dysfunction, and abnormal urinalysis findings, the clinical presentation was initially attributed to an upper urinary tract infection. Blood and urine cultures were obtained, and empirical treatment with ceftriaxone was initiated. Subsequent cultures yielded extended-spectrum beta-lactamase (ESBL)-producing *Escherichia coli* and ampicillin-resistant *Klebsiella pneumoniae*, prompting a switch to imipenem, which was administered for eight days.

During hospitalization, the patient experienced persistent low back pain. Abdominopelvic CT revealed a 6-mm distal right ureteral calculus with dilation of the urinary collecting system and perirenal inflammatory changes. The clinical presentation was therefore reinterpreted as a complicated urinary tract infection associated with a migrating ureteral stone. The stone was treated with endoscopic ureteral lithotripsy and double-J stent placement. The stent was removed one week later, after resolution of the obstruction, with initial improvement in pain, fever, and acute-phase reactant levels.

Subsequently, the patient developed recurrent fever and chills, and laboratory tests again showed elevated acute-phase reactants and leukocytosis. Repeat contrast-enhanced abdominopelvic CT revealed right-sided dilation of the renal collecting system with perirenal fat stranding but no identifiable cause of obstruction. It also revealed a saccular aneurysm of the abdominal aorta, which had not been present on previous imaging studies (Fig. 1).

Blood cultures were again positive for extended-spectrum beta-lactamase (ESBL)-producing *Escherichia coli*, while urine culture yielded *Citrobacter koseri*, prompting the reinitiation of antibiotic therapy with meropenem.

Because of persistent bacteremia, further investigations were performed to identify secondary infectious foci. Transthoracic echocardiography showed preserved ventricular function and no vegetations, while fundoscopic examination revealed no lesions suggestive of septic emboli. Infective endocarditis was therefore considered unlikely.

After one week of targeted antibiotic therapy, the patient remained febrile, with persistently elevated inflammatory markers. Previous CT imaging had revealed a newly developed saccular aneurysm of the abdominal aorta. Given these findings, PET/CT was performed to investigate a possible vascular infectious focus. The study showed intense fluorodeoxyglucose (FDG) uptake in the aneurysmal wall, consistent with a mycotic abdominal aortic aneurysm, which had increased in size compared with the previous CT scan (Figs. 2 and 3).

Given the rapid growth of the aneurysm and the high risk of complications, the patient was transferred to the intensive care unit for hemodynamic monitoring.

A multidisciplinary team evaluated the case. Because of the patient's moderate frailty, as assessed using the Clinical Frailty Scale⁹, and the technical complexity of the procedure, surgical and endovascular interventions



Figure 1. Contrast-enhanced abdominopelvic CT, coronal section in the arterial phase, showing a $13 \times 12.2 \times 14.7$ mm saccular aneurysm of the abdominal aorta, above the origin of the renal arteries (red arrow), with associated stranding of the adjacent retroperitoneal fat.

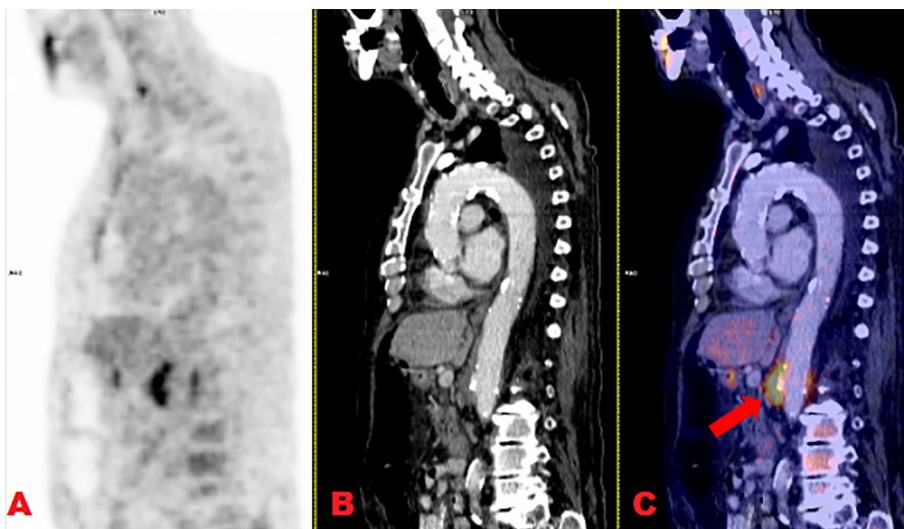


Figure 2. Fluorodeoxyglucose PET/CT, sagittal view. Image A (PET) shows an area of increased metabolic activity involving the abdominal aorta. Fused image C shows a mycotic abdominal aortic aneurysm measuring approximately $30 \times 21 \times 41.5$ mm, proximal to the origins of the renal arteries.

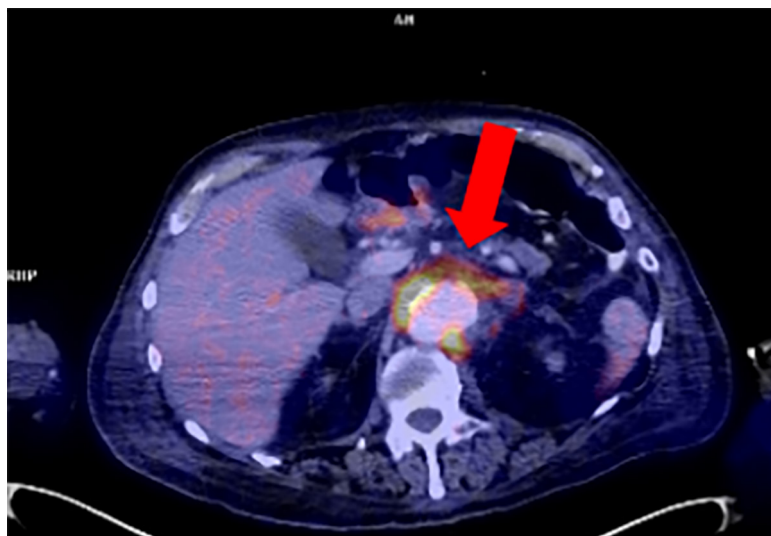


Figure 3. Fluorodeoxyglucose PET/CT, axial view. The fused image shows a mycotic abdominal aortic aneurysm surrounded by hypermetabolic soft-tissue-density material with increased fluorodeoxyglucose uptake, predominantly on the left side, reaching a *standardized uptake value* (SUV) of 10.8 (normal range for soft tissue: 0.5–1.5).

were ruled out. The team decided to continue exclusively medical management with prolonged antibiotic therapy.

During hospitalization, the patient showed a favorable clinical course, with resolution of fever and a progressive decline in inflammatory markers. He was discharged with instructions to complete at least six weeks of intravenous antibiotic therapy at home, with clinical and imaging follow-up. He subsequently died of causes unrelated to the mycotic aneurysm, precluding completion of postdischarge follow-up.

ETHICAL CONSIDERATIONS

The study was approved by the institutional Ethics Committee (CEPI 7277, PRIISA 14414).

DISCUSSION

Although most mycotic aneurysms are associated with *Salmonella* species or *Staphylococcus aureus*, some reports have identified *Enterobacteriaceae* as causative pathogens, particularly in urinary tract infections or bacteremia of abdominal origin. However, cases involving multidrug-resistant organisms remain rarely reported in the literature^{2,7}.

Although no universally accepted diagnostic criteria exist for mycotic aneurysms, in the present case, the diagnosis was established in accordance with the approach proposed in major reviews and the American Heart Association scientific statement^{2,3}, integrating clinical, microbiological, and imaging findings. Persistent bacteremia caused by extended-spectrum beta-lactamase (ESBL)-producing *Escherichia coli*, ongoing systemic inflammation despite appropriate antibiotic therapy, a rapidly enlarging saccular aneurysm, and periaortic

inflammatory changes on CT, together with intense FDG uptake on PET/CT, strongly suggested an infectious etiology^{4,6}. Furthermore, the absence of vegetations on echocardiography and septic emboli on fundoscopic examination, together with the lack of FDG uptake suggestive of endocarditis on PET/CT, made infective endocarditis unlikely. In contrast, the coexistence of documented bacteremia and compatible metabolic findings on PET/CT supported the diagnosis of a mycotic aneurysm rather than a noninfectious inflammatory aneurysm^{4,6}.

In the management of mycotic aneurysms, open surgery involving resection of the affected segment and vascular reconstruction is considered the standard of care.

Endovascular techniques have emerged as an alternative in selected patients, offering lower perioperative mortality but carrying a risk of late infectious complications. In the present case, the patient's advanced age and frailty prompted the decision to adopt a conservative approach with prolonged antibiotic therapy. Although medical management alone is generally associated with a poorer prognosis, some reports describe favorable outcomes with careful patient selection and close follow-up^{7,8}.

This case highlights the importance of maintaining a high index of suspicion for endovascular infection in patients with fever of unknown origin and persistent bacteremia, particularly when they fail to improve clinically despite targeted antibiotic therapy, and the value of PET/CT in guiding diagnosis. It also underscores that, in selected patients with preexisting frailty and high surgical risk, medical management alone may be a reasonable therapeutic option.

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