

## AN EMPHYSEMATOUS MYCOTIC ANEURYSM OF THE INFRARENAL AORTA INFECTED WITH SALMONELLA ENTERICA

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### ABSTRACT

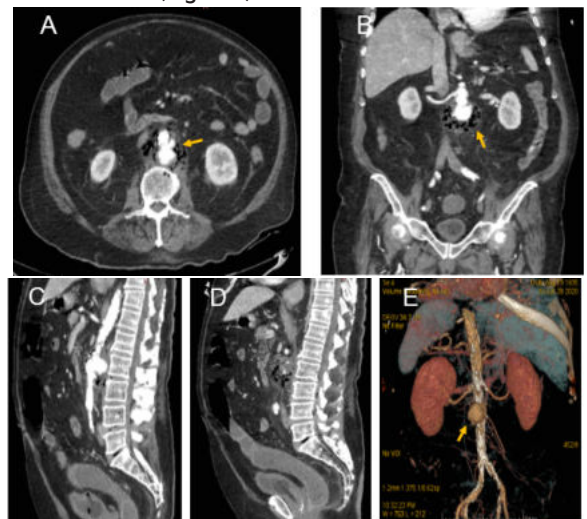
**SUMMARY:** Mycotic aneurysm (MA) of the aorta is a rare and potentially life-threatening if unrecognized and promptly treated. We report a case of an 84-year-old man with a medical history for poorly-controlled diabetes mellitus type II, hypertension, chronic alcoholism and smoking; who presented to the emergency department with 3-week history of fever, chills, malaise, and weakness in bilateral lower extremities. On initial examination, he presented low grade of fever and desaturation of peripheral oxygen 77%. Moreover, his laboratorial analysis suggested features of infectious process and hypoxemia. Due to current ongoing pandemic, initially COVID-19 (corona virus disease 2019) was suspected and real-time reverse transcriptase polymerase chain reaction test for SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2) was performed. Unexpectedly, chest computerized tomography (CT) ordered to exclude COVID-19 reported the superior part of a MA of the infrarenal aorta. Further contrast-enhanced CT with angiogram of the abdomen revealed the complete MA with periaortic collection containing multiple air pockets, spondylodiscitis of L2 and aorto-iliac atherosclerosis, impended to the rupture. Blood culture grew a strain of *Salmonella enterica* serovar *Enteritidis*, the cause of an emphysematous MA of the infrarenal aorta, abdominal aortitis and L2 spondylodiscitis.

**KEYWORDS :** *Salmonella Enterica*; infectious arterial aneurysm; mycotic aneurysm; emphysematous mycotic aneurysm; abdominal aortitis.

### CASE PRESENTATION

An 84-year-old man presented to emergency department in June 2020, with 3-week history of malaise, chills, intermittent fever and marked weakness in bilateral lower extremities. One week earlier, he had suffered from liquid stool and persistent fever up to 38°C, for which he was treated with cefixime (400mg S.I.D.) and azithromycin (500mg S.I.D.) by the first physician in-charge, but without clinical benefit. The patient had a medical history of poorly-controlled diabetes mellitus, hypertension, chronic alcoholism and smoking. He was not known with previous abdominal aortic aneurysm. On examination, his temperature was 37.4°C, blood pressure was 115/55 mmHg, pulse rate was regular at 86 beats per minute and saturation of peripheral oxygen was 77%. The patient was somnolent but was able to follow simple commands. On abdominal examination, deep palpation of the left upper abdominal quadrant and epigastric region caused mild discomfort and pain. There were no peripheral signs of infective endocarditis. The remainder physical examination was unremarkable. His laboratory analysis reported elevated peripheral-blood leukocyte count (21,400 cells/ $\mu$ L), with neutrophilia (15,096 cells/ $\mu$ L). A diagnosis of renal dysfunction was made by elevated serum creatinine (2.41 mg/dL). He showed elevated inflammatory markers: sedimentation rate of (45 mm/h), procalcitonin levels of (35.7 ng/mL), and C reactive protein of (35.1 mg/dL). Urine analysis was normal. By the arterial blood gas analysis, acute respiratory alkalosis and hypoxemia (pO<sub>2</sub> 51.5 mmHg), with hyperlactatemia (3.4 mmol/L) was suggested. Due to the current pandemic outbreak of COVID-19, initially COVID-19 was suspected in the absence of a clear infectious focus, considering the patient's initial lower grade of fever, low saturation of peripheral oxygen, and laboratory features of

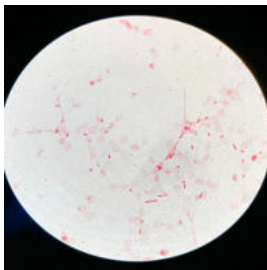
sepsis and hypoxemia. Thus, real-time reverse transcriptase polymerase chain reaction test for SARS-CoV-2 was performed, with negative result. Chest CT ordered to exclude COVID-19 suggested the site of infection; the superior part of a saccular aneurysm was seen unexpectedly. The extended abdominal and pelvic contrast-enhanced CT was performed and revealed a saccular aneurysm located at the infrarenal aorta with periaortic collection containing multiple air pockets, spondylodiscitis of L2 and aorto-iliac atherosclerosis. (Figure 1)



**Figure 1.** Contrast-enhanced CT with angiogram of the abdomen and pelvis. (A) Transverse view of the abdominal CT scan shows saccular aneurysm located at the infrarenal aorta

with periaortic collection containing multiple air pockets, spondylodiscitis of L2 and aorto-iliac atherosclerosis (arrow). (B) Coronal view of abdominal CT with intravenous contrast. (C and D) Sagittal view of abdominal CT with intravenous contrast. (E) Reconstructive CT angiogram shows MA formation (arrow).

Treatment with vancomycin and ceftriaxone was started empirically. Blood cultures grew pan-sensitive *Salmonella enterica* serovar *Enteritidis* (Figure 2)



**Figure 2. Gram stain of the gram-negative bacilli identified as *Salmonella Enterica* on blood culture.**

and a diagnosis of emphysematous mycotic aneurysm of the infrarenal aorta, abdominal aortitis and L2 spondylodiscitis was made. On the following days after admission, a long-term antibiotic strategy was established as treatment, rather than surgical or endovascular intervention, after weighing the patient's age, comorbidities and anesthetic risk. A month later, he died from unknown cause.

## DISCUSSION

The MA and aortitis are a rare and potentially life-threatening if unrecognized and untreated. [1] The infectious aortitis may arise through bacterial seeding of atherosclerotic plaques, direct extension from contiguous infection, penetrating trauma, septic emboli or vascular intervention. [2] As a complication, the majority of aortitis may result in aneurysm formation or, rarely, enlargement of a previously existing aneurysm. [3]

The term *mycotic aneurysm* was first described by Sir William Osler in 1885, to denote a case with valve vegetations complicated by 4 aortic aneurysms with morphologically fungal resemblance. [3, 4] Since then, the term *Mycotic* has been used in literature to refer both bacterial and fungal origins. [3] Originally, the microbiology of mycotic aneurysm was associated to bacterial endocarditis and the most common site involved were aortic arch and ascending aorta. [5] However, currently the incidence of bacterial endocarditis has declined due to the widespread use of antibiotics, now MA involves the abdominal aorta where the existing atherosclerotic plaque is found. [5] *Staphylococcus aureus* is the most common pathogen cultured (30%), following by *Streptococcus* (10%) and *Salmonella* (10%), and other gram-negatives are involved in MA of immunodeficient patients and intravenous drug-users. [6, 7]

*Salmonella* are non-encapsulated and non-spore-forming gram-negative enterobacteria, reported in 1886 by Salmon and Smith, that have involved in various human infections; gastroenteritis, enteric fever, bacteremia, localized infection and chronic infection. [3] One of the most severe extraintestinal complication site is the endovascular infection, with a mortality rate of up to 36%. [8] The risk factors investigated include male gender, age over 50 years, hypertension, diabetes, atherosclerosis, invasive catheterization, cancer, and immunodeficiency. [3, 5, 9] In the post-antibiotic era, the majority of the reported cases of *Salmonella* aortitis arose in the abdominal aorta, rather than thoracic aorta (20%). [3]

The diagnosis of *Salmonella* MA and aortitis is often delayed since symptoms and signs are usually non-specific and the classical triad of fever, abdominal pain and pulsatile abdominal mass is not present invariably. [8] Its natural history may present with profound sepsis, rapid dissection of MA and its rupture. [10] In laboratory analysis, typically elevated leukocyte count with neutrophilia and elevated inflammatory markers are found. [10] For the microbiological diagnosis, it is important to consider that the blood cultures are positive in 50-75% of patients with reduced rates in those patients who received previously antibiotics. [10] Contrast-enhanced CT is used for the assessment for the initial diagnosis and follow-up of the disease. [11] The prompt beginning of intravenous antibiotic therapy is the cornerstone but, it is imperative to consult a vascular surgeon for early endovascular intervention. [8] There is no consensus over treatment of *Salmonella* MA and aortitis, therefore, further investigations are required to define it. [12]

Emerging evidence from China, South Asia and Europe, the COVID-19 pandemic made its way to Latin America and after having a time advantage on preparation. [13] By mid-July 2020, 12,000,000 have been confirmed with COVID-19 worldwide and 6,000,000 in Latin America. [14] In Mexico, early imported cases were reported on 28<sup>th</sup> February; 280,000 cases were confirmed with 33,000 death rates. [14, 15] Mexico is situated in an exponentially rising phase of COVID-19, in the burden of overstretched health services and centered resources to confirm the disease. [15] Current screening approaches for COVID-19 share recognizable symptoms with any other infection process, such as fever, dyspnea, fatigue, malaise, diarrhea, and abdominal symptoms. [16] Thus, any infectious case might be misclassified as COVID-19 if symptoms or signs are used to assess a case and it has been challenging for health-care workers and physicians to take appropriate steps for investigations of other differential diagnosis. [16]

Our case is about an elderly man with underlying predisposing medical conditions for *Salmonella* infection with non-specific symptoms of septic process, consistent with the current status of mycotic aneurysms' cases worldwide. The febrile illness, low saturation of peripheral oxygen with gradually deteriorating into sepsis, confirmed with laboratory analysis initially drove us to take initial approaches for COVID-19, which unexpectedly helped us to find local vascular expansion and aneurysm enlargement in the CT scan on the first day of admission to the hospital, making short the course of diagnosis and the beginning of antibiotic administration. We encourage that physicians should consider aggressive approach when there is awareness of risk factors and symptoms and high suspicion of MA, whether if pandemic COVID-19 status existed or not.

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