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Case Report

A case report on mycotic aneurysm by non-typhoidal *Salmonella*

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ABSTRACT

Non-typhoidal *Salmonella* (NTS) causing an aortic aneurysm is a rare and serious condition referred as mycotic aneurysm or infected aneurysm. The condition arises with the penetration of *Salmonella* into aortic wall leading to inflammation, structural compromise and the risk of dilation or rupture of the arterial wall. Due to the considerable morbidity and mortality linked with this condition, prompt diagnosis and vigorous treatment is crucial. This report outlines the case of a 67-year-old male with several comorbidities presented with intense lower back pain and fever. Blood cultures confirmed the presence of Gram-negative bacilli, specifically non-typhoidal *Salmonella*. Magnetic resonance imaging (MRI) showed infrarenal abdominal aortic aneurysm and computed tomography (CT) depicted multilobulated saccular aneurysm originating from the anterior wall of the infrarenal abdominal aorta, accompanied by a large peripheral hypodense thrombus. The patient successfully underwent endo-vascular aortic aneurysm repair (EVAR) along with antibiotic therapy. The combination of timely surgical intervention and extended antibiotic treatment resulted in excellent outcomes for the patient.

Keywords: Mycotic aortic aneurysm, Endovascular aortic repair, Non-typhoidal *Salmonella*, Infrarenal abdominal aortic aneurysm

INTRODUCTION

A mycotic aneurysm is a localized, rapidly developing, fatal, irreversible vascular dilatation due to the destruction of the arterial wall with an infectious cause. In Western nations, *Staphylococcus aureus* accounts for 28% of mycotic aneurysms, followed by *Salmonella species* (15%) and *Pseudomonas aeruginosa* (10%), but the majority of Asian nations reports *Salmonella* as causative agent.[1] *Salmonella species* are classified as typhoidal and non-typhoidal, according to their pathogenic characteristics. Typically, non-typhoidal salmonellosis manifests with symptoms such as fever, diarrhea, and abdominal cramping. The risk of bacteremia is 20–100 times higher in the elderly and immunocompromised than in the general population and endovascular complications are more common in these individuals.[2]

Diagnosis relies on the clinical presentation, radiographic imaging and culture findings. Due to the nonspecific symptoms such as back pain, abdominal discomfort and fever, a heightened level of suspicion is necessary for diagnosing infectious aortitis.[3]

Timely diagnoses is essential, as microbial arteritis accompanied by aneurysm carries a significant risk of rupture and subsequent mortality if not addressed. Despite strong therapeutic measures, the mortality is still high, hence it is important to start empirical intravenous antibiotic therapy and endovascular aortic repair as soon as the diagnosis is confirmed.[4]

Here we report the diagnosis and management of abdominal aortic aneurysm resulting from non-typhoidal *Salmonella* in 67-year-old male.

CASE REPORT

A 67-year-old male presented with complaints of severe lower back pain and fever. On physical examination blood pressure was 160/80 mmHg, pulse rate 110 beats/ minute and temperature 101 °F. Laboratory examination revealed haemoglobin (Hb) 9.30 g/dl, WBC 14010/mm^3, C-reactive protein (CRP) 25.30 mg/dl and rheumatoid arthritis (RA) factor of 15 IU/ml. The human immunodeficiency virus (HIV) screening returned a non-reactive result, the urine culture showed no growth while the blood culture confirmed the presence of Gram-negative bacilli, specifically non-typhoidal salmonella. Based on the patient's initial conditions, as well as physical and laboratory examinations, he was diagnosed with abdominal aortic aneurysm secondary to non-typhoidal *Salmonella* with a background of hypertension, type 2 diabetes and rheumatoid arthritis.

A 2D echocardiogram indicated the presence of aortic valve sclerosis, along mild concentric left ventricular hypertrophy. Magnetic resonance imaging (MRI) findings shown a transitional vertebra at the lumbosacral junction, accompanied by lumbarization of the S1 vertebra. A focal saccular aneurysm was identified, measuring 4.1×4.2×2.7 cm with the lumen measuring 2.5×1.6×2.9 cm and a neck measuring 1.4 cm (Figure 1). This anomaly arises from the anterior wall of the abdominal aorta at the L3-L4 level. Additionally, an associated T2 hyperintense eccentric signal was observed within the aneurysm, reaching a maximum of 17 mm, with surrounding fat stranding, consistent with an infrarenal abdominal aortic aneurysm exhibiting partial eccentric thrombosis of the lumen at the L3-L4 level. There is a diffuse disc bulge that indents the anterior thecal sac. A computed tomography (CT) aortogram suggested the presence of a multilobulated saccular aneurysm originating from the anterior wall of the infrarenal abdominal aorta, just inferior to the origin of mesenteric artery (IMA) (Figure 2). This aneurysm is associated with a large peripheral hypodense thrombus that compresses the adjacent inferior vena cava (IVC), which shows a narrowed lumen, and is anteriorly eroding into the posterior wall of the third part of the duodenum, with mild surrounding retroperitoneal and periduodenal fat stranding. The osti proximal segment of the IMA is noted to drape around the superolateral aspect of the aneurysmal wall, resulting in mild luminal compromise. Thus, the diagnosis of infectious aortitis by non-typhoidal salmonella was established, and the patient started treatment with injection ceftriaxone (2 gm IV, twice daily, 6 weeks).

A consultation with the rheumatology department was taken concerning the patient's rheumatoid arthritis and recommendations were implemented. Following the pre-anesthesia checkup, the patient underwent endovascular aneurysm repair (EVAR) for abdominal aortic aneurysm and was stabilized in the high dependency unit (HDU) (Figure 3). Throughout the hospital stay, the patient received intravenous fluids, intravenous antibiotics, antiplatelet medications. The patient exhibited symptomatic improvement and is being discharged. During follow up PET CT revealed no abnormalities and blood culture had no bacterial development.

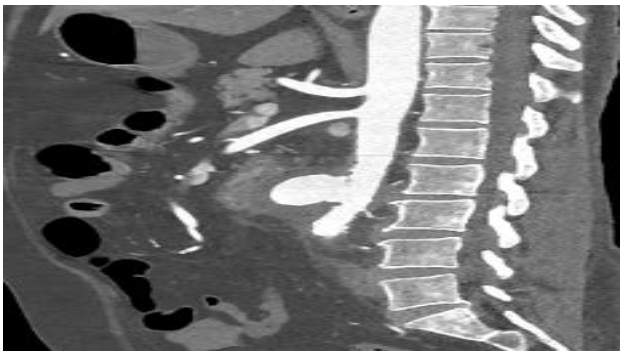

Figure 1: MRI showing a transitional vertebra at the lumbosacral junction and focal saccular aneurysm.

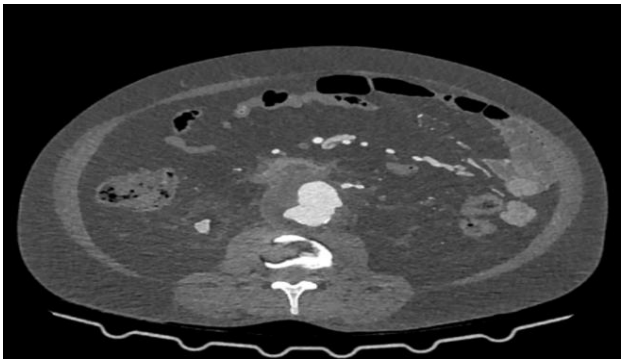

Figure 2: CT scan depicting the presence of a multilobulated saccular aneurysm originating from the anterior wall of the infrarenal abdominal aorta.

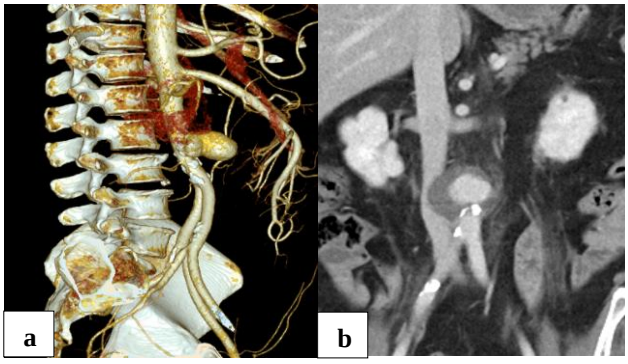

Figure 3 (a and b): Endovascular aneurysm repair for aortic aneurysm.

DISCUSSION

Mycotic aneurysms were most frequently caused by syphilis, TB and untreated endocarditis before the widespread use of antibiotics. *Staphylococcus* has recently been identified as the most frequent cause of mycotic aneurysms followed by *Salmonella*. An infected aortic

aneurysm arising from non-typhoidal *Salmonella* is one of the most severe endovascular complications that can occur due to Salmonellosis.[6]

Fever, lower back or chest pain, positive blood cultures, elevated WBC, heightened levels of inflammatory markers such as CRP are significant contributors to the diagnosis of mycotic aneurysms. In our case also, blood tests demonstrated elevated WBC and heightened CRP levels. The most effective imaging modalities for detecting mycotic aneurysms were CT and magnetic resonance imaging (MRI). The diagnostic results are marked by the presence of saccular, multilobulated soft tissue stranding surrounding the aorta, along with irregular peripheral enhancement of the arterial walls.[6] Based on the classical symptoms, positive blood cultures and presence of multilobulated saccular aneurysm originating from the anterior wall of the infrarenal abdominal aorta from MRI and CT scans, we confirmed the abdominal aortic aneurysm affected by non-typhoidal *Salmonella*. The abdominal aorta, especially the infrarenal abdominal segment, is the most common location for infected aneurysms, followed by thoracic and suprarenal abdominal aorta.[7]

Non-typhoidal *Salmonella* is unique due to its propensity to adhere to damaged endothelium, especially atherosclerotic arterial walls. Hypertension and diabetes may result in atherosclerotic and necrotic changes in the arterial walls, thus increasing the likelihood of bacterial adherence. Other risk factors for abdominal aortic aneurysm include age over 65 years, male gender.[8] Our patient is 67 years old with diabetes mellitus and hypertension, which are known atherosclerotic risk factors, likely contributed to the development of a mycotic aneurysm.

Management of abdominal aortic aneurysm includes a multidisciplinary approach (vascular surgeons, and general physician) with surgical repair of aneurysms and long-term antibiotics. Two surgical approaches are recommended: open aneurysm repair or EVAR with higher mortality in open compared to EVAR. To date, the literature primarily consists of case reports and limited series detailing successful EVAR for aortic aneurysms pertaining to *Salmonella* infection.[9] Endovascular techniques can be used only for certain situations, such as absence of gross purulence, gross infection, aorto-digestive fistula and uncontrolled sepsis.[10] Our patient presented with significant comorbid conditions and there were no indications of extensive purulence or fistula. Accordingly, in line with the established guidelines, we treated him with endovascular aortic repair and a regimen of long-term antibiotics, ensuring vigilant monitoring throughout the process.

CONCLUSION

Non-typhoidal *Salmonella* aortitis is a life-threatening condition. Due to the vague symptoms that patients may present with, there should be high clinical suspicion in the right clinical context, especially those with significant risk factors for atherosclerosis. Antibiotic treatment and surgical procedures (EVAR) constitute the primary approach to manage the condition. Current case enhances awareness of this condition and may aid medical professionals in achieving an accurate diagnosis and determining the most effective treatment options.

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