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Case report

Salmonella Typhimurium para-aortic root abscess managed non-surgically

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ABSTRACT

Introduction: Para-aortic root abscess is a destructive vascular condition that can result in significant morbidity and mortality. We describe a rare case of para-aortic root abscess due to *Salmonella* Typhimurium that was successfully managed medically.
Presentation of case: A 72-year-old diabetic man with a prosthetic aortic graft presented with fever and expressive aphasia with left sided weakness. Magnetic resonance imaging (MRI) of the brain showed multiple embolic cerebral vascular accidents. Computed tomography angiography (CTA) of the chest showed a 5.7 × 2.7 cm (cm) para-aortic root abscess. Blood cultures grew *Salmonella* Typhimurium. The patient was started on ceftriaxone initially, and then ciprofloxacin was added on day 5. Given an unacceptably high risk of mortality expected with surgery, the patient was managed medically.
After five months of both ceftriaxone and ciprofloxacin, ceftriaxone was stopped. Twelve months later, the patient is doing well on ciprofloxacin alone with a plan for lifelong suppression.
Discussion: Cases of para-aortic root abscess due to *Salmonella* Typhimurium have not been reported in the literature. There are no guidelines to dictate the antibiotic choice or management of para-aortic root abscess due to *Salmonella* Typhimurium.
Conclusion: This report adds to the body of literature regarding the treatment of this infection including successful non-surgical management.

Introduction

Para-aortic root abscess is a destructive vascular condition that can result in significant morbidity and mortality [1]. It is typically the result of infection of the aortic valve, a prosthetic aortic graft, or an atherosclerotic plaque that can lead to aortitis with aneurysm formation and if left untreated, subsequent rupture [1]. Salmonella is a bacterial genus within the family *Enterobacteriaceae* that consists of a large group of genetically similar organisms with the ability to infect a large number of animal hosts and humans [2]. The bulk of clinical disease in animals and humans is caused by serovars within the *Salmonella enterica* subspecies [2]. Infections are typically classified into those caused by *Salmonella* Typhi (typhoid fever) and those caused by non *Salmonella* Typhi (NST) such as in this case [2]. *Salmonella enterica* serovar Typhimurium has traditionally been a zoonotic bacterium acquired from animals but is increasingly becoming a food-borne pathogen [3]. It typically causes a self-limited gastroenteritis in humans, but can develop into a severe systemic disease mostly in immunocompromised patients [3]. Some *Salmonella* Typhimurium infections in humans are linked to intake of contaminated food products from poultry, cattle and pigs, however, in recent years a significant number of outbreaks have been traced back to fresh vegetables, fruits, and even peanut butter [3]. Several other clinical syndromes related to *Salmonella* Typhimurium have been encountered, including bacteremia, infectious diarrhea, enteric fever, and a chronic carrier state within the gallbladder [4]. Salmonella may seed any anatomical site hematogenously; however, involvement of the cardiovascular system is rare [4].

We describe an unusual case of para-aortic root abscess due to *Salmonella* Typhimurium, which was successfully managed medically.

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Case

A 72-year-old diabetic man with a prosthetic aortic root graft presented with eight days of fever and weakness. On examination, he was febrile and hemodynamically unstable with an expressive aphasia, dysarthria, left facial droop, and weakness of the left hand and lower extremity. Otherwise, the examination was normal. Blood cultures were obtained and empiric antimicrobial therapy with vancomycin and piperacillin-tazobactam was initiated. Magnetic resonance imaging (MRI) of the brain showed multiple embolic cerebral vascular accidents. Trans-esophageal echocardiography (TEE) showed an ascending aortic anterior wall flap without aortic valve vegetation. Computed tomography angiography (CTA) of the chest showed a 5.7 x 2.7 cm para-aortic root abscess with internal gas formation associated with trace free fluid in the mediastinum (Figs. 1 & 2). The patient quickly developed multi-organ failure requiring mechanical ventilation and dialysis.

On the second hospital day, blood cultures grew *Salmonella* Typhimurium. The antimicrobial treatment regimen was narrowed to ceftriaxone alone to which the organism was sensitive. The patient continued to be febrile and critically ill; therefore, ciprofloxacin was added on day five. Given the patient's comorbidities and his clinical status, a multispecialty team determined he would have an unacceptably high risk of mortality if he underwent surgical debridement, therefore, he was managed medically. Blood cultures taken one week after the initiation of antimicrobials were sterile. He completely defervesced by day fourteen of the hospital stay. To avoid intravenous contrast, a positron emission tomography (PET) scan was performed on hospital day nineteen to follow the abscess which revealed an increase in the size when compared to the initial CTA with intense fluorodeoxyglucose uptake at the aortic root as well as mildly avid mediastinal lymph nodes (Figs. 3 & 4).

After one month of inpatient treatment with intravenous ceftriaxone and oral ciprofloxacin, he was discharged home to continue the same antimicrobial regimen for two more months. The patient underwent a follow-up PET scan three months after the initial, which showed a 7 x 6.6 cm fluid collection that was mildly increased in size. Intravenous ceftriaxone and oral ciprofloxacin were continued for an additional two months. After receiving a total of five months of both ceftriaxone and ciprofloxacin, ceftriaxone was stopped. The patient has been kept on ciprofloxacin alone with a plan for lifelong treatment. He is doing reasonably well to date with mild residual left hemiparesis, 1 year after his initial hospitalization

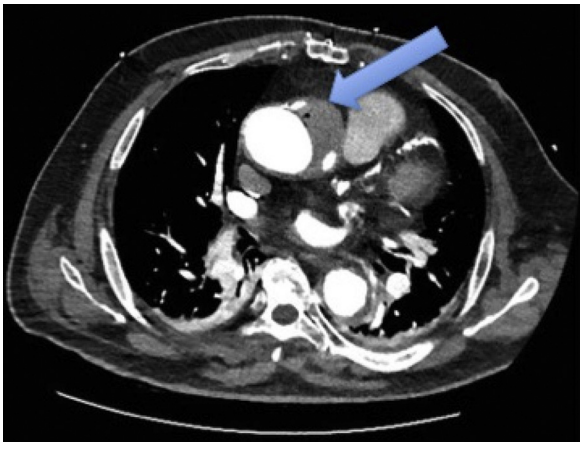

Fig. 1. Contrast-enhanced CT axial view of the chest showing para-aortic root collection containing pockets of gas in keeping with para-aortic root abscess.

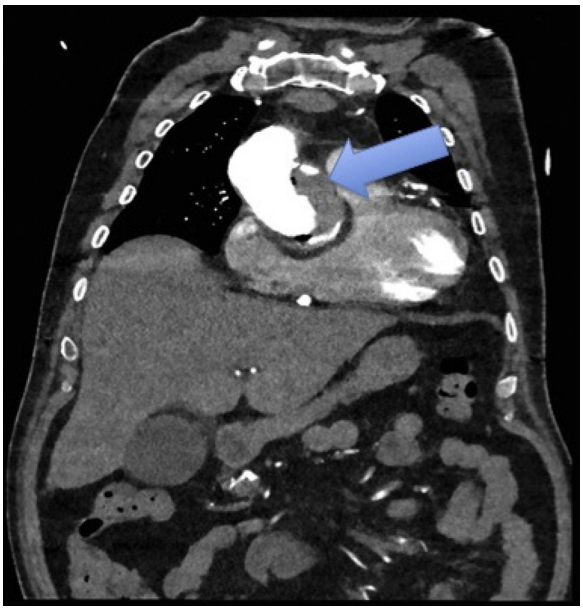

Fig. 2. Contrast-enhanced CT coronal view of the chest showing para-aortic root collection containing pockets of gas in keeping with para-aortic root abscess.

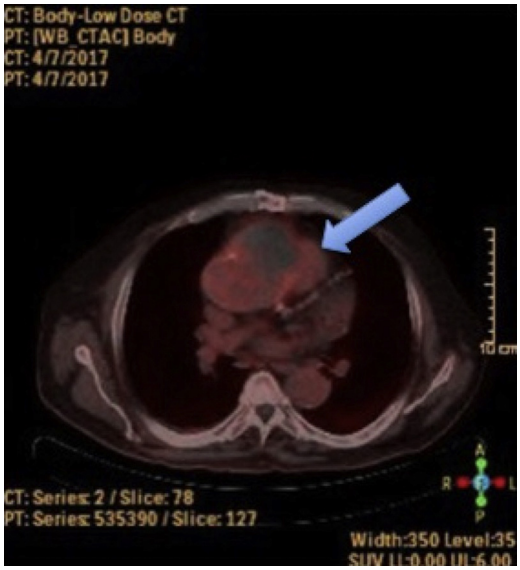

Fig. 3. PET-scan axial view showing para-aortic collection, predominantly photopenic with intense FDG-uptake identified at the inferior most component (medial aspect of the aortic root). Findings are keeping with patient's infectious para-aortic abscess.

Discussion

In this case, the infection was likely secondary to the ingestion of a contaminated food product with intestinal inflammation and transluminal migration of bacteria resulting in bacteremia. Given the embolic strokes and TEE findings, he appeared to have an intravascular focus at the aortic root that ultimately embolized as well as led to para-aortic root abscess formation.

Several risk factors exist for invasive *Salmonella* Typhimurium infection including advanced age, implantable medical devices, gastric surgeries, gastric acid suppression, pernicious anemia, immune-compromised state [diabetes mellitus, cancer, corticosteroid therapy, human immunodeficiency virus (HIV) and malaria infection]; however, some patients have no underlying disease [5].

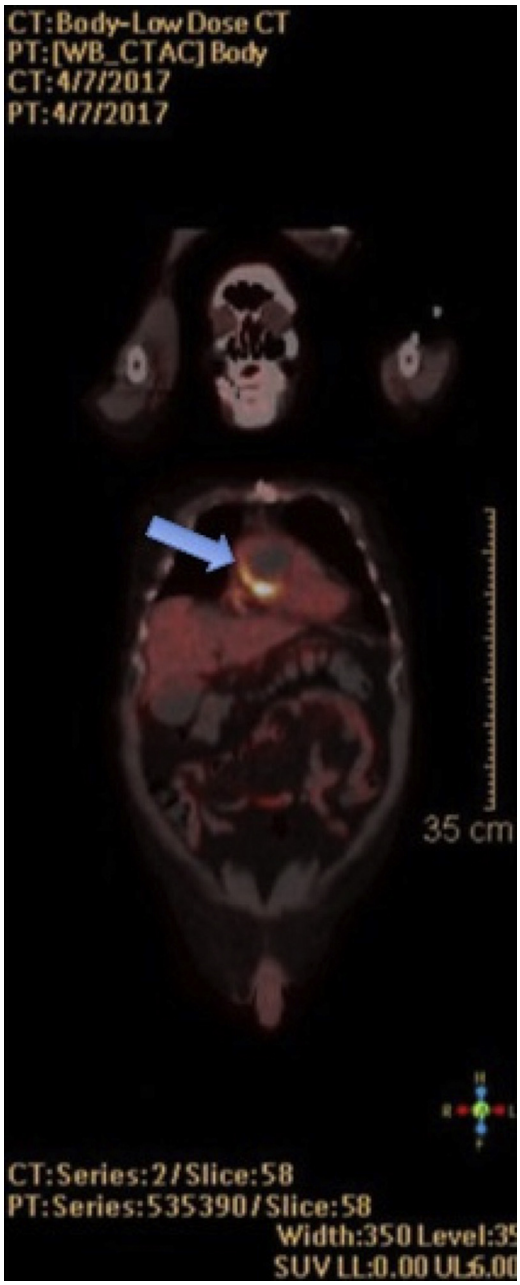

Fig. 4. PET-scan coronal view showing para-aortic collection, predominantly photopenic with intense FDG-uptake identified at the inferior most component (medial aspect of the aortic root). Findings are keeping with patient's infectious para-aortic abscess.

Cardiac involvement with Salmonellae is uncommon [6]. Based on a recent review of the literature between 1976 to 2014, only 87 cases of Salmonella endocarditis were reported [6]. Among 16 large case series, Salmonella endocarditis accounted for less than 0.01% and up to 2.9% of bacterial endocarditis cases, which reflects the rarity of cardio-vascular involvement by Salmonella species [6].

Gram-negative bacilli (Salmonella species in most of the cases) can cause aortic infection; however, it is more prevalent in abdominal aortitis as compared to thoracic [7]. It usually affects patients with prior atherosclerotic aortic disease [7]. Cases of para-aortic root abscess due to *Salmonella* Typhimurium are absent from the literature. There are no guidelines to dictate the antibiotic choice or course of treatment for this infection. The optimal timing of surgical intervention in para-aortic root abscess is difficult to determine [8]. Disease control and remission in aortitis is preferred for excellent surgical outcomes when surgery is needed and that is to improve surgical results and limit complications [8]. However urgent interventions are needed in certain circumstances such as: aortic aneurysms, vascular ulcers, vascular fistula or vessel occlusion [8]. There are no randomized controlled studies to guide the management of infectious aortitis. Most authors agree that antibiotic therapy in combination with complete surgical excision of the infected aorta is the best course of action [9].

Increase application of positron emission tomography/computed tomography (PET/CT) with use of 18-Fluoro-2-deoxy-D-glucose (18F-FDG) in the diagnosis of inflammatory and infectious diseases has recently been observed [10]. As in other inflammatory diseases, increased FDG uptake is seen in vascular graft infection in areas of activated granulocytes [11]. Most of the available literature regarding the use of the PET-CT imaging for the diagnosis of aortic and vascular infections is based on case series and case reports. It appears it could be helpful in assessment of disease activity before treatment as well as to monitor therapeutic response or to detect relapse of the disease despite the therapy [12]. In our case, despite an "enlarging" abscess on follow up PET scan, the patient improved clinically with no change in therapy.

Death occurs in all cases of infectious aortitis that are left untreated [13]. However, a combination of surgical and medical therapy may lead to a survival rate of 75%–100% before aneurysm formation, and 62% after an aneurysm has formed [13]. With medical treatment alone, mortality rates are quoted to be near 90% [14]. In this case, surgical intervention was not attempted given the patient's comorbidities and critical medical condition.

This is a rare case of *Salmonella* Typhimurium para-aortic root abscess that was treated successfully non-surgically. The patient has survived for almost a year since his initial presentation with resolution of most of his symptoms. However, the patient is still maintained on suppressive therapy with ciprofloxacin. He underwent two PET-scan imaging tests and based on the interpretation, still has a large abscess in his aortic root. The utility of PET scan in this patient is questionable given his clinical improvement yet worsening imaging report. This case highlights the rarity of the finding of a para-aortic root abscess due to *Salmonella* Typhimurium and the ability to treat the patient non-surgically when surgery is not a safe option.

Author statement

Tarek Haykal, MD: idea, data acquisition, data analysis, manuscript writing.

Abdul Rahman Al Bizri, MD: Mentor, data analysis, manuscript editing.

Thair Dawood, MD: Mentor, data analysis.

Danielle Osterholzer, MD: Mentor, data analysis, manuscript editing.

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