

An Unusual Infectious Cause of Abdominal Pain: Non-typhoidal Salmonella Aortitis Complicating an Endovascular Aortic Stent Graft

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Abstract

Non-typhoidal *Salmonella* (NTS) is a rare but life-threatening cause of infectious aortitis and mycotic aneurysm formation, predominantly affecting immunocompromised patients and those with pre-existing vascular pathology or prosthetic hardware. Diagnosis is frequently delayed due to its non-specific clinical presentation and the poor sensitivity of conventional blood cultures. A 73-year-old immunocompromised woman with a history of penetrating aortic ulcer and prior endovascular aortic stent graft placement presented with progressive abdominal pain and para-aortic soft tissue thickening encasing the infrarenal aorta. Blood cultures were negative; however, CT-guided peri-aortic tissue aspiration and metagenomic next-generation sequencing (mNGS; Karius test) identified *Salmonella enterica* serovar Enteritidis susceptible to ampicillin, ceftriaxone, levofloxacin, nalidixic acid, and trimethoprim/sulfamethoxazole. The most probable infection source was the patient's prolonged daily consumption of unpasteurized eggs from backyard chickens. She was treated with intravenous (IV) ceftriaxone for 30 days followed by 18 months of oral cephalexin suppression, with significant radiographic improvement at three-month follow-up. Surgical intervention was deferred given her high operative risk from metastatic malignancy and multiple comorbidities. This case is notable for its documentation of culture-negative NTS aortitis complicating an endovascular stent graft, in which mNGS was essential for pathogen identification. It further highlights the importance of eliciting detailed dietary exposure history in high-risk patients, the novel diagnostic challenge posed by concurrent autoimmune disease mimicking non-infectious vasculitis, and the feasibility of antibiotic-only management in carefully selected surgical non-candidates.

Categories: Nuclear Medicine, General Surgery, Infectious Disease

Keywords: immunosuppression and vascular infections, infected aortic stent, infectious aortitis, penetrating aortic ulcer complications, salmonella aortitis

Introduction

Non-typhoidal *Salmonella* (NTS) is a rare but significant cause of aortitis and aneurysm formation [1,2]. Most NTS infections arise from contaminated food sources, with unpasteurized or undercooked eggs from farm-raised chickens representing a primary vehicle for *Salmonella enteritidis* transmission [3-5]. The Centers for Disease Control and Prevention (CDC) reported 796 *S. enteritidis* outbreaks between 1985 and 1998 in the United States, of which 82% with a confirmed source were associated with raw or undercooked shell eggs, underscoring the magnitude of this exposure risk [3-5]. The CDC's Bacteria, Enterics, Ameba, and Mycotics (BEAM) Dashboard reported more than 12,000 *S. enteritidis* isolates in both 2024 and 2025, with chicken and shell eggs remaining the leading implicated commodities [6]. While most NTS infections are self-limited gastrointestinal illnesses, invasive NTS can seed vascular structures, particularly in patients with underlying atherosclerosis, vascular hardware, or immunosuppression [1,7].

NTS aortitis poses significant diagnostic and management challenges. Conventional microbiologic methods, including blood cultures and tissue Gram stain, frequently fail to identify the causative organism, leading to delays in targeted treatment [1,2,8]. Advanced molecular diagnostics, such as metagenomic next-generation sequencing (mNGS), have emerged as valuable tools in culture-negative vascular infections, though their role in this setting remains to be fully defined. Management of endovascular stent graft infections typically requires prolonged intravenous antibiotic therapy combined with surgical intervention followed by lifelong suppressive treatment [1,2]; however, a subset of patients are poor surgical candidates, and the evidence base for medical management alone is limited to small case series.

We report this case to contribute several clinically significant and underrepresented observations to the NTS aortitis literature: (i) the utility of mNGS in establishing a diagnosis when conventional cultures are non-diagnostic; (ii) the novel diagnostic challenge posed by concurrent autoimmune disease, which mimicked non-infectious vasculitis and delayed pathogen identification; (iii) a plausible mechanism of graft infection via pre-implantation *Salmonella* bacteremia seeded by chronic unpasteurized egg consumption; and (iv) the

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feasibility of antibiotic-only management with meaningful radiographic response in a patient precluded from surgery by metastatic malignancy and multiple comorbidities.

Case Presentation

A 73-year-old female patient presented to an outside emergency department with one week of abdominal pain, constipation, and back pain. She had a past medical history of hypertension, Sjögren's syndrome, centrilobular emphysema, metastatic adenocarcinoma of the left lung on chemotherapy/immunotherapy, chronic hypoxic respiratory failure, paroxysmal atrial fibrillation on apixaban, hypothyroidism, rheumatoid arthritis, polymyalgia rheumatica, biliary dyskinesia, colonic polyps, and peripheral artery disease with prior drug-eluting iliac stenting and endovascular repair of a penetrating aortic ulcer (six months prior). Computed tomography (CT) of the abdomen and pelvis with contrast revealed an increase in moderate left hydronephrosis and progressive para-aortic soft tissue of soft tissue density encasing the infrarenal abdominal aorta and stent graft. She was subsequently re-admitted to a tertiary care center two months later for further evaluation.

On admission, the patient was hemodynamically stable; initial blood pressure was 188/53 mmHg, stabilizing to 126/78 mmHg by day's end. Physical examination was notable for a mildly distended abdomen with epigastric tenderness to palpation. Complete blood count (CBC) was consistent with pre-existing chronic anemia. Comprehensive metabolic panel (CMP) was notable for hyponatremia (sodium 132 mEq/L). Medications at the time of admission are listed in Table 1. Selected laboratory values are summarized in Table 2.

Medication	Dose	Route	Frequency	Indication
Apixaban	5 mg	Oral	Twice daily	Atrial fibrillation
Atorvastatin	10 mg	Oral	Twice daily	Hyperlipidemia
Clopidogrel	75 mg	Oral	Once daily	Secondary stroke prevention
Folic acid	1 mg	Oral	Once daily	Supplementation (with methotrexate)
Hydroxychloroquine	200 mg	Oral	Twice daily	Rheumatoid arthritis
Lactulose	10 mL	Oral	Once daily	Hepatic encephalopathy
Levothyroxine	75 mcg	Oral	Once daily	Hypothyroidism
Methotrexate	15 mg	Oral	Once weekly	Rheumatoid arthritis
Mirtazapine	15 mg	Oral	At bedtime	Depression
Olanzapine	5 mg	Oral	At bedtime	Schizophrenia or mood disorder
Pantoprazole	40 mg	Oral	Twice daily	Gastroesophageal reflux disease (GERD)
Prochlorperazine	10 mg	Oral	As needed three times daily PRN	Nausea

TABLE 1: Medications and corresponding indications.

Parameter	Reference Range (Adult)	Patient Value
Physical Exam		
Afebrile	< 100.4°F (38°C)	–
Blood Pressure (BP)	~120/80 mmHg	140/70
Heart Rate (HR)	60–100 bpm	70
SpO2	≥ 95%	97%
Complete Blood Count		
RBC	Male: 4.7–6.1 M/μL; Female: 4.2–5.4 M/μL	2.49 (Low)
Hemoglobin	Male: 13.8–17.2 g/dL; Female: 12.1–15.1 g/dL	7.8 (Low)

Mean corpuscular volume	80–100 fL	103.2
Hematocrit	Male: 40.7–50.3%; Female: 36.1–44.3%	25.7
Red blood cell distribution width	11.5–14.5%	19.4
Neutrophils	40–60%	87
Comprehensive Metabolic Panel		
Glucose	70–99 mg/dL	156
Blood urea nitrogen/Creatinine ratio	10:1–20:1	25
Calcium	8.5–10.5 mg/dL	8.4
Inflammatory Markers		
C-reactive protein	< 3 mg/L	14.55
Erythrocyte sedimentation rate	Male: < 15 mm/hour; Female: < 20 mm/hour	88
Coagulation		
Prothrombin time	11–13.5 seconds	15
Rheumatological parameters		
DNA (dsDNA Ab)	≤ 4 Negative	<1 IU/mL
Chromatin Ab	<1.0 AI	0.2
Ribosomal P Ab	<1.0 AI	<0.2
Sjögren's-Syndrome-Related Antigen A (Ro)	<1.0 AI	>8.0 (High)
Sjögren's-Syndrome-Related Antigen B (La)	<1.0 AI	>8.0 (High)
Centromere B Ab	<1.0 AI	<0.2
Sm (Smith) Ab	<1.0 AI	0.3
Sm riboprotein	<1.0 AI	<0.2
Ribonucleoprotein Ab	<1.0 AI	<0.2
Scl-70	<1.0 AI	<0.2
Jo-1	<1.0 AI	<0.2
Microbiology		
Karius Test	Negative	Positive for <i>Salmonella</i> -Non-Typhi
Culture	Negative	Positive for <i>Salmonella</i> -Non-Typhi
Liver Function Tests		
Total bilirubin	0.3 – 1.2 mg/dL	0.4
Alanine aminotransferase)	Men: 7 – 55 U/L; Women: 7 – 45 U/L	18
Alkaline phosphatases	40 – 129 U/L	123
Total protein	6.0 – 8.3 g/dL	6.6
Albumin	3.5 – 5.0 g/dL	3.4 (Low)

TABLE 2: Physical exam and laboratory findings

Given the clinical picture of possible cancer metastasis, surgical intervention was deferred, and a fluorine-18 labelled fluorodeoxyglucose (¹⁸F-FDG) PET/CT scan was ordered. It demonstrated hypermetabolic activity at a periaortic/perigraft soft tissue mass inferior to the aortoiliac bifurcation, circumferentially encasing approximately 75% of the lower aorta (Figure 1). Whole-body coronal and sagittal projections

further confirmed the extent of periaortic uptake and demonstrated additional thoracic foci corresponding to the patient's known primary lung malignancy (Figure 2). Comparison with a prior whole-body PET/CT obtained two years earlier during routine oncologic surveillance confirmed the absence of periaortic uptake at that time, establishing this as a new interval finding (Figure 3). In the context of a prior penetrating aortic ulcer and aortic instrumentation, the findings were suspicious for aortitis; metastatic disease from the known primary lung carcinoma was considered unlikely given the significant treatment response in the thorax. Cystoscopy with left ureteral stent placement was performed for moderate left-sided hydronephrosis; renal ultrasound one month later confirmed resolution.

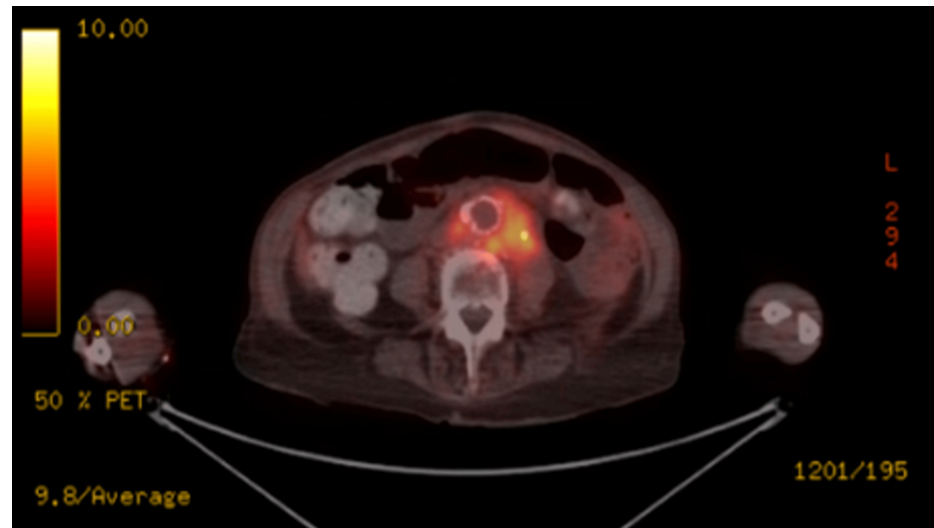


FIGURE 1: Axial ^{18}F -FDG PET/CT fusion image demonstrating focal hypermetabolic activity in the periaortic soft tissue circumferentially encasing the infrarenal aorta and endovascular stent graft, consistent with infectious aortitis.

^{18}F -FDG: fluorine-18 labelled fluorodeoxyglucose

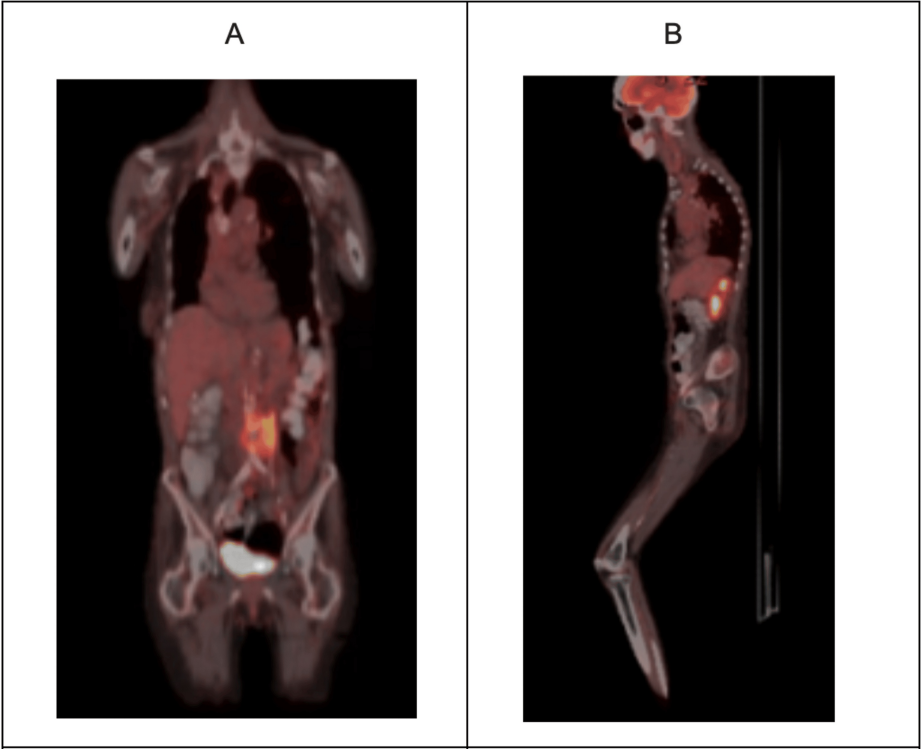


FIGURE 2: Whole-body ^{18}F -FDG PET/CT fusion imaging.

(A) Coronal view demonstrating focal hypermetabolic activity in the periaortic soft tissue at the level of the infrarenal aorta, suspicious for infectious aortitis in the setting of prior endovascular stent graft placement. The pelvic hypermetabolic focus represents physiologic bladder activity. (B) Sagittal view confirming periaortic uptake, with additional thoracic foci corresponding to the patient's known primary lung malignancy.

^{18}F -FDG: fluorine-18 labelled fluorodeoxyglucose

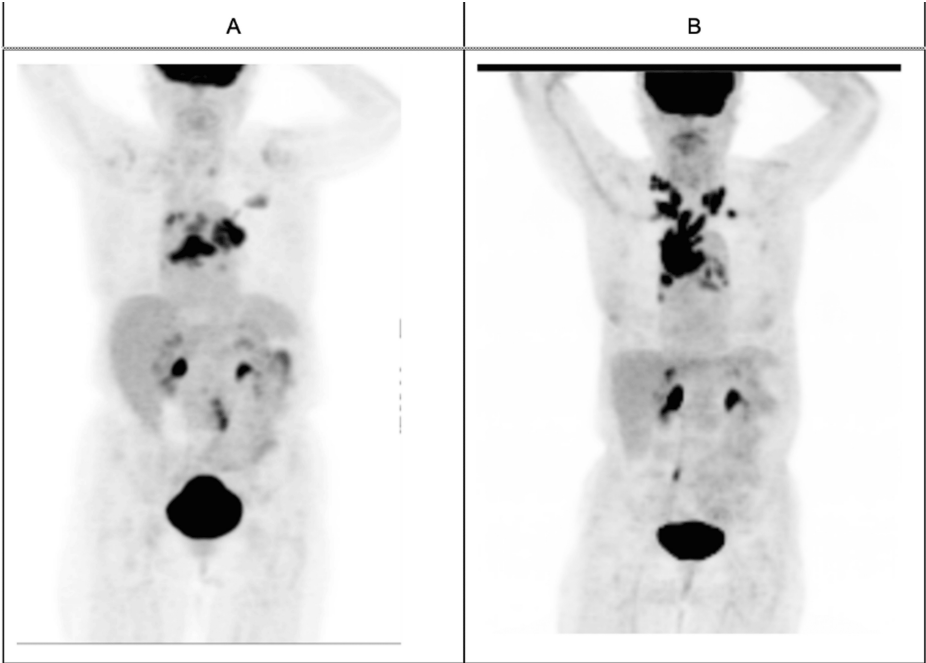


FIGURE 3: Comparative whole-body PET scans confirming the aortic activity represents a new interval finding.

(A) Coronal PET image obtained at the time of aortitis presentation demonstrating increased metabolic activity in the periaortic soft tissue at the level of the infrarenal aorta. (B) Baseline coronal PET image obtained two years prior during routine oncologic surveillance, showing no periaortic uptake

Rheumatology workup to evaluate for vasculitis revealed an antinuclear antibody (ANA) titer of 1:640 and anti-Sjögren's antibodies (SS-A and SS-B), both elevated at > 8.0 AI, consistent with the patient's known diagnoses. All remaining rheumatologic panels were noncontributory (Table 2). Although no formal multidisciplinary team conference was convened, her care was coordinated across infectious disease, vascular surgery, interventional radiology, oncology, rheumatology, urology, and palliative care, whose collective input informed the decision to defer surgical intervention and pursue antibiotic-based management.

Antiplatelet therapy was held, and a CT-guided percutaneous core needle biopsy of the periaortic soft tissue was performed five days later (Figure 4). Histology was negative for acid-fast bacilli (AFB) and for microorganisms on Grocott's methenamine silver (GMS) stain; CD68 staining revealed numerous histiocytes, and Prussian blue staining demonstrated hemosiderin deposits (Table 3).

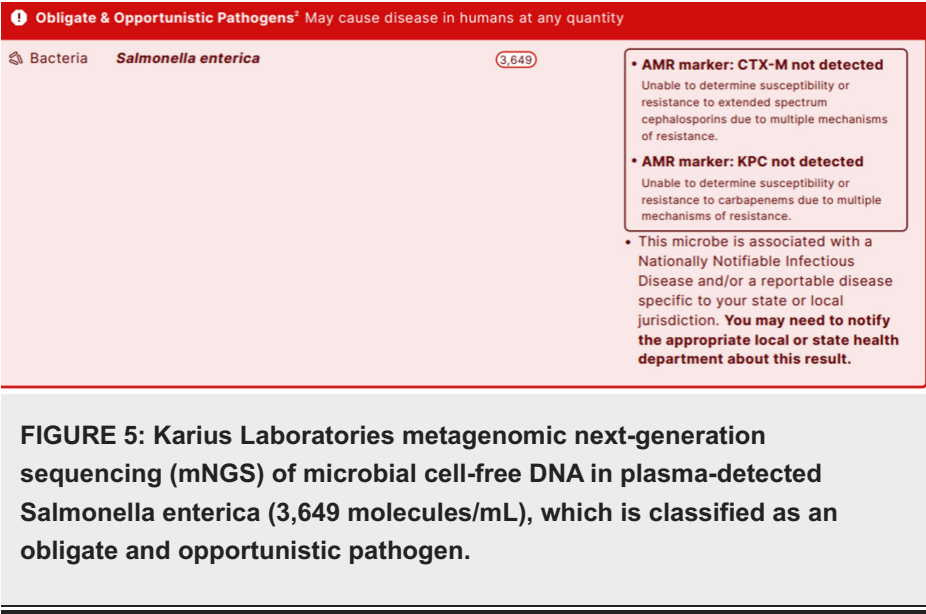


FIGURE 4: CT-guided percutaneous coaxial core needle biopsy of periaortic soft tissue.

Microscopic Examination	Result
Immunohistochemical stain for Oscar keratin	Negative
CD68	Highlights numerous histiocytes
S100	Negative
Ki-67	Highlights only rare cells
AFB (Acid-Fast Bacilli)	Negative for microorganisms
GMS (Grocott's Methenamine Silver)	Negative for microorganisms
Prussian blue iron stain	Highlights hemosiderin deposits
Controls for immunohistochemical stains	Reacted appropriately

TABLE 3: Immunohistochemical and special stain findings in the histopathological examination.

The patient was evaluated by the infectious diseases service. Syphilis antibodies were non-reactive, two sets of blood cultures demonstrated no growth, and Gram stain and smear of retroperitoneal aspirate revealed no organisms. Empiric IV cefazolin 2 grams every eight hours was initiated for 11 days. Karius's mNGS of cell-free plasma DNA was positive for *S. enterica* alone (Figure 5) [9]. A Gram stain of peri-aortic tissue obtained by core needle biopsy was negative, but non-typhi *Salmonella* sp. was recovered in anaerobic cultures from CT-guided peri-aortic aspiration and identified as *S. enterica* serovar Enteritidis by matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS), confirming the diagnosis of *Salmonella* aortitis. These *Salmonella* non-typhi organisms were susceptible to ampicillin, ceftriaxone, levofloxacin, nalidixic acid, and trimethoprim/sulfamethoxazole.



Upon further questioning, following the positive mNGS result, the patient disclosed that she had been consuming farm-fresh, unpasteurized eggs from her neighbor's backyard chickens on a daily basis for an extended period preceding her aortic stent placement. Backyard chickens frequently harbor *S. enteritidis*, which can contaminate both the shell surface and internal egg contents in the absence of commercial pasteurization [3], in direct contrast to commercially processed eggs, which are subject to United States Department of Agriculture (USDA)/United States Food and Drug Administration (FDA)-mandated refrigeration, sanitation, and pasteurization standards [5]. This chronic dietary exposure suggests that *Salmonella* was already present at the time of stent implantation, and that the graft was placed into an already-seeded tissue bed [10]. The complete clinical timeline is shown in Figure 4.



FIGURE 6: Timeline of events.

PRN: *pro re nata* (as needed); LQ: lower quadrant; SSA: Sjögren's Syndrome A; SSB: Sjögren's Syndrome B; ANA: antinuclear antibody

The patient was discharged after 16 days with a peripherally inserted central catheter (PICC) line for IV ceftriaxone 2 grams daily for 30 days (four weeks and two days), followed by oral cephalexin 500 mg three times daily for 18 months. She resumed her oncologic chemotherapy regimen. Repeat CT abdomen/pelvis at the three-month follow-up demonstrated a significant interval decrease in periaortic soft tissue density, with only a small residual soft tissue thickening remaining to the left of the infrarenal aorta. The prior endovascular repair of the penetrating aortic ulcer had been uncomplicated, with no documented post-procedural infection, endoleak, or vascular compromise.

During the current admission, the patient tolerated IV cefazolin and subsequently IV ceftriaxone without adverse drug reactions. The CT-guided percutaneous biopsy and peripherally inserted central catheter (PICC) line placement were likewise without complication, and no adverse events were encountered during the 30-day outpatient IV therapy course or subsequent oral suppression.

Discussion

Non-typhoidal *Salmonella* aortitis is a rare but life-threatening condition, frequently complicating pre-existing aortic pathology or immunosuppression [1,2,7]. Our patient, a 73-year-old woman with prior aortic stent grafting, metastatic adenocarcinoma, and autoimmune disease (Sjögren's syndrome, rheumatoid arthritis), illustrates the diagnostic and therapeutic challenges posed by NTS aortitis in the immunocompromised host. Consistent with previously reported cases, she presented with non-specific abdominal and back pain in the absence of classic fever or bacteremia, a documented feature of this

infection that reflects its variable and frequently occult clinical course [1,2,8].

Regarding the infection source, the patient's daily consumption of farm-fresh, unpasteurized eggs from backyard chickens represents the most epidemiologically plausible exposure identified. *S. enteritidis* is endemic in backyard poultry and frequently contaminates both the shell surface and egg interior in the absence of commercial pasteurization. The CDC documented that 82% of 360 confirmed-source *S. enteritidis* outbreaks between 1985 and 1998 were linked to raw or undercooked shell eggs, a risk substantially amplified by unregulated backyard flocks [3]. However, direct microbiologic confirmation of the source, such as environmental sampling of the flock or serotype-matching between isolates, was not performed in this case. The dietary history, therefore, establishes a plausible and likely exposure, not a proven one. Regardless of causation, patients with vascular prostheses, immunosuppression, or significant comorbidities should be explicitly counseled against consumption of unpasteurized eggs and other high-risk foods [4,11].

The timeline of dietary exposure and vascular instrumentation raises a critical pathophysiological question: was *Salmonella* present before the aortic stent was placed? This cannot be definitively established from the available clinical data. What is known from the literature is that NTS can cause transient or low-grade bacteremia that goes undetected, particularly in immunocompromised patients who mount a blunted inflammatory response [9], and that aortic prosthetic grafts are highly susceptible to hematogenous seeding prior to the development of a stable neointima [7]. We hypothesize that subclinical *Salmonella* bacteremia or intestinal translocation may have occurred prior to or at the time of stent implantation, resulting in the graft being seeded at or shortly after placement. This remains speculative, however, as pre-implantation blood cultures were not available to confirm or exclude bacteremia at that time. Clinicians should nonetheless consider this mechanism in patients with vascular hardware who subsequently develop NTS infection, as it reframes the event from a post-procedural complication to an unmasked pre-existing bacteremia [1,2,7].

Diagnosis in this case was established by Karius mNGS (Figure 3) after conventional blood cultures and tissue biopsies failed to identify a pathogen [1,8], a finding that underscores the growing clinical utility of advanced molecular diagnostics in culture-negative aortitis. The management of our patient diverged from standard protocols due to her metastatic malignancy and cumulative comorbidities. While the literature emphasizes surgical resection with graft replacement or in-situ reconstruction as the preferred approach [1,10], she was deemed a poor surgical candidate and managed conservatively with long-term antibiotics. Three-month follow-up imaging demonstrated significant radiographic improvement, paralleling outcomes described in select medically managed cases [2,11]. Whether this improvement reflects durable disease control or a temporary response remains uncertain, given her limited life expectancy and the reported three-year mortality of approximately 75% with conservative management alone [2]. Her favorable early response likely reflects the combined effect of early detection via PET/CT and pathogen-directed antimicrobial therapy guided by mNGS results, though this interpretation is inferential. Finally, the presence of autoimmune disease complicated her initial presentation, as elevated inflammatory and rheumatologic markers prompted consideration of non-infectious vasculitis, a diagnostic pitfall that, to our knowledge, has not been previously described in the NTS aortitis literature, and which further delayed pathogen identification.

Several key clinical lessons emerge from this case. First, NTS aortitis may present without fever or bacteremia, necessitating a high index of suspicion and advanced diagnostics such as mNGS when conventional cultures are non-diagnostic [1,2,8]. Second, a thorough dietary exposure history is essential: unpasteurized backyard chicken eggs were the most probable *Salmonella* source in this case, and patients with vascular hardware or immunosuppression must be counseled explicitly on food safety risks [3,4,11]. Third, the possibility that *Salmonella* preceded stent implantation should be considered, though this mechanism can rarely be confirmed retrospectively and remains hypothetical in individual cases [7]. Fourth, medical management may be appropriate in carefully selected patients who are not surgical candidates, but surgery remains first-line for unstable or enlarging aneurysms, and long-term outcomes with antibiotic therapy alone are poor [1,10]. Fifth, immunocompromised patients may exhibit atypical inflammatory profiles that mimic non-infectious vasculitis, warranting individualized diagnostic workup before attributing periaortic inflammation to autoimmune disease.

Conclusions

This case highlights several practical lessons for clinicians managing patients with vascular prostheses and immunosuppression. First, NTS aortitis can present without fever or bacteremia; mNGS (Karius test) was indispensable for pathogen identification after conventional cultures failed. Second, chronic daily consumption of unpasteurized backyard chicken eggs represented the most plausible infection source, underscoring the need to elicit specific dietary exposure history in patients with vascular hardware or immunocompromise. Third, the concurrent presence of autoimmune disease introduced a diagnostic pitfall; elevated inflammatory and rheumatologic markers initially suggested non-infectious vasculitis, delaying the infectious workup. Finally, in patients who are not surgical candidates, prolonged antibiotic therapy with close radiographic monitoring may achieve meaningful disease control, though long-term outcomes remain guarded and surgery remains first-line for eligible candidates.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. University of Illinois College of Medicine at Peoria IRB 1 issued approval 2388806-1. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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