Case report

Resolution of atrial-ventricular block secondary to Listeria monocytogenes with antimicrobials

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ABSTRACT

Listeria endocarditis is a rare, but serious disease with high mortality rate. Currently, little is known regarding the optimal treatment modality of Listeria endocarditis in affected individuals. Here, we present the case of a 66-year-old female with history of mitral and aortic replacement with bioprosthetic valve, and hospital course complicated by Listeria monocytogenes infective endocarditis with atrial-ventricular (AV) block. Listeria monocytogenes infection was eradicated by a 6-week antimicrobials course involving ampicillin and gentamicin, culminating in the resolution of AV block. On further investigation, the patient admitted to frequent consumption of salami and provolone cold-cut sandwiches, which based on previous evidence in literature is hypothesized to be the source of infection. Our findings suggest the development of perivalvular abscesses as the cause of the AV block. To our knowledge, this is the first reported case in literature where AV block secondary to listeriosis resolved with treatment solely by antimicrobials. While further research and larger studies are needed to extend our findings, patients with AV block secondary to listeriosis may benefit from optimized management with antimicrobials.

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Introduction

Listeria monocytogenes (L. monocytogenes) is a gram-positive, facultative, intracellular, aerobic rod bacterium which is mostly transmitted through oral ingestion of contaminated food [1,2]. Although it is ubiquitous in the environment, Listeria infection is rare [3]. It is more common in immunosuppressed patients where it may cause meningitis and infective endocarditis [3–6].

Despite increased surveillance [4], improved safety practices in food handling [7], and general understanding of the pathogen, L. monocytogenes infection is still associated with a high fatality rate of up to 30% [3,8]. According to the Centers for Disease Control and Prevention (CDC), about 260 people are estimated to die annually due to Listeria infection [9]. Although generally regarded as a rare foodborne pathogen [7], periodic outbreaks of L. monocytogenes arising from contaminated food is common [10]. The CDC estimates that more than 1500 individuals are infected by listeriosis annually [9], thus emphasizing its significant public health implications and ability to elicit life-threatening events in affected individuals. For example, at the time of publication of this case report, in 2019, the Centers for Disease Control and Prevention has reported two multistate outbreaks of L. monocytogenes infection in the United States linked to contaminated pork products and deli-sliced meats and cheese [11,12]. Hospitalizations was required in all the affected individuals, and death was reported in an individual [11,12]. Similar outbreaks have been reported in other countries [1,3,14], and even from sandwiches sold in hospitals [15], indicating the ubiquitous nature of possible contamination.

Few studies describing Listeria infection and cardiac complications have been reported in literature [1–3]. A literature review indicated that less than 70 cases of endocarditis due to L. monocytogenes were reported in literature from 1955 to 2004, indicating the rarity of this disease [3]. Agulnik et al. reported a case of listeriosis in pregnancy complicated by heart block [16]. Other investigators have reported the involvement of L. monocytogenes in endocarditis, prosthetic valve endocarditis, fetal pericarditis, myocarditis and myocardial infarction [1,3]. Pseudotumor of the heart and pseudomembranous right atrial involvement in L. monocytogenes septicemia has also been reported in the literature [17]. Yet, there remains a paucity of research characterizing atrioventricular (AV) block and its relationships with listeriosis in literature. Here, we present a rare case of AV block in a patient with bioprosthetic valves involving L. monocytogenes.

Case report

A 66-year-old former-smoker presented to the emergency room after referral from her primary doctor’s office with shortness of
breath which was worse at night and associated with lower extremity edema for a week. The patient reported non-productive cough, night sweats and intermittent dizziness, aggravated on standing and moving. When specifically questioned, she denied the presence of chills. Her medical records indicated a history of chronic obstructive pulmonary disease necessitating home oxygen as needed, diabetes mellitus, morbid obesity (body mass index of 55), coronary heart disease with cardiac stent, mitral and aortic replacement with bioprosthetic valves, and Hodgkin’s lymphoma in remission at the time of recent hospitalization. Initial vitals on presentation was heart rate 50 beats per minute, blood pressure 140/74 mm Hg and temperature 37 °C. Physical exam was remarkable for soft, distant regular heart sounds and bilateral pitting edema. Laboratory investigations showed white blood cell count of 18,000/μL with 88.7% of polymorphonuclear cells, initial troponin of 0.19 ng/mL which trended up to 0.55 ng/mL and B-type natriuretic peptide of 1159 pg/mL. Chest X-ray showed mild pulmonary vascular congestion. An electrocardiogram (EKG) showed 2:1 AV block with episodes of AV dissociation. Due to initial suspicion of non-ST elevation myocardial infarction (NSTEMI) and congestive heart failure exacerbation, on the day of admission, the patient was started on intravenous (IV) heparin drip, oral aspirin 81 mg, rosuvastatin 20 mg, and furosemide 40 mg IV administered daily. Empirical treatment on ceftriaxone 1 g IV every 12 h and oral doxycycline 100 mg twice daily was also initiated under the clinical suspicion of community acquired pneumonia.

The electrophysiology team was consulted for AV block, culminating in the recommendation of a pacemaker implanted secondary to symptomatic high-grade AV block. Due to NSTEMI on presentation, coronary angiogram was done which revealed normal right coronary and left main arteries, with patent stent in left anterior descending artery. Transthoracic echocardiogram following coronary angiogram showed ejection fraction of 71%–75%, normal left ventricular (LV) systolic function, moderate LV diastolic dysfunction, and normally functioning aortic bioprosthetic valve.

Blood cultures drawn on the day of admission grew *L. monocytogenes* within 36 h which was susceptible to ampicillin and gentamicin. As such, the patient was started on ampicillin 2 g IV every 6 h and gentamicin per level for synergistic activity against *L. monocytogenes*. On further investigation, the patient reported consuming salami and provolone cold-cut sandwiches on a regular basis which is suspected to be the source of infection. Repeat blood cultures drawn 24 h after the initiation of antimicrobials were negative. With our patient’s presentation of *L. monocytogenes* with new onset AV block, transesophageal echocardiogram was performed for evaluation of endocarditis. The results indicated high suspicion of endocarditis of the mitral valve and aortic valve with adjacent abscess. The cardiothoracic surgery team evaluated the patient for surgical intervention. After careful consideration of the potential risks versus benefits associated with surgery, and discussions with the patient, it was collectively decided not to proceed with surgical intervention until the patient had had bariatric surgery to reduce the surgical-related mortality. Repeat EKG showed resolution of the AV block and during her hospital stay the patient did not have any long pauses. It was therefore decided not to place a pacemaker due to the risk of infecting the pacemaker. Alternatively, a peripherally inserted central catheter (PICC) line was placed, and patient was discharged with a total of 6-week course of ampicillin and two weeks of gentamicin per level, and lifelong suppressive antimicrobials with amoxicillin-clavulanic acid until patient is optimized to undergo cardiothoracic surgery. Unfortunately, despite our best efforts, we were unable to reach the patient after discharge for a follow-up visit.

**Discussion**

A common source of transmission of *L. monocytogenes* is contaminated food. Dairy and poultry products, fish and ready-to-go meals are some of the food commonly associated with *L. monocytogenes* infections [1]. Although rare, listeriosis is documented as the third leading cause of death among pathogens transmitted commonly through food [10]. In our case report, the patient reported frequent consumption of provolone cold-cut sandwiches on a daily basis. Therefore, there is the possibility of frequent consumption of these food products as the likely source of transmission to this patient. Although other mechanistic causal mechanisms cannot be completely ruled out, based on biologic plausibility and evidence from previous reports [3,18], our findings suggest the development of perivalvular abscesses as the likely cause of AV in this patient.

The involvement of listeriosis with AV block is yet to fully characterized in medical literature. During our review of published literature, we found only two case reports that reported AV block associated with listeriosis [16,17]. In the case report by Uehara et al. [17], the patient was found to have a pseudotumor made up of *L. monocytogenes*. The patient subsequently required a pacemaker due to persistent symptomatic bradycardia despite receiving treatment with antimicrobials. A similar outcome was observed in the case report by Agulnik et al. [16]. Of note, in both reported cases, despite negative culture results following the initiation of antimicrobial therapy, the investigators reported that cardiac outcomes progressively worsened. In contrast, in our case, treatment with antimicrobials led to resolution of AV block, hence, the implantation of a pacemaker was not warranted. To our knowledge, there has not been a reported case where AV block secondary to *L. monocytogenes* solely resolved with antimicrobial use.

Historically, treatment of Listeria endocarditis involves antimicrobials with or without surgical intervention. B-lactam antimicrobials, usually ampicillin or penicillin with the combination of an aminoglycoside for synergistic effect are frequently mentioned in literature [1,3,8]. *L. monocytogenes* is also susceptible to vancomycin, sulfamethoxazole/trimethoprim and other fluoroquinolone antimicrobials [3]. Nevertheless, the optimal treatment of endocarditis due to *L. monocytogenes* is yet to be well-defined [1,3]. In their review of literature published prior to 2004, Fernández Guerrero et al. reported no statistically significant differences in survival rates between patients with prosthetic valve endocarditis due to *L. monocytogenes* treated with antimicrobials alone versus those managed with a combination of antimicrobials and valve replacement. [3] Similar findings have been reported by other authors [1], thus emphasizing the need for well-designed studies to evaluate the most effective treatment modality in affected individuals.

In this case report, despite the presence of aortic abscess, it was decided to hold-off on surgery due to the predicted high risk and poor clinical outcomes arising from the patient’s morbid obesity. We found treatment with antimicrobials alone to be successful in the eradication of *L. monocytogenes* and resolution of symptoms associated with AV block. The patient was scheduled for a repeat transesophageal echocardiogram four weeks after discharge to reassess for the resolution of endocarditis and valvular abscess. Despite these encouraging clinical outcomes, we recognize that valve replacement may be necessary in some individuals particularly in patients with myocardial abscess, cardiac failure or valve dehiscence [3].

**Conclusion**

Endocarditis due to *L. monocytogenes* is an uncommon, but potentially life-threatening conditions. AV block secondary to this
is even more rare. Unlike in previous reports, we report a complete resolution of Listeria infection and an overall improvement in cardiac-related outcomes following antimicrobial therapy. These findings suggest that improvement of cardiac outcomes secondary to L. monocytogenes may in fact be variable. Considering the significant rate of morbidity and mortality associated with listeriosis, clinicians should be aware of sole therapy with antimicrobials as part of their armamentarium against infective endocarditis caused by L. monocytogenes. Nevertheless, individualized management of endocarditis due to L. monocytogenes should be highly encouraged while further research is needed to confirm the validity of these findings.

Ethical statement

Our study did not require an ethical board approval; however, this study was performed in accordance to the ethical standards of the institution.

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CRediT authorship contribution statement

Anuoluwapo Shobayo: Conceptualization, Data curation, Investigation, Methodology, Writing - original draft, Writing - review & editing. Krishna Kommineni: Conceptualization, Data curation, Investigation, Methodology, Writing - original draft, Writing - review & editing. Kvaita Sharma: Conceptualization, Data curation, Investigation, Methodology, Writing - original draft, Writing - review & editing.

Declaration of Competing Interest

We have no known conflicts of interest to declare.

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