Triad of Terror: Rapidly Progressive Austrian Syndrome in a 62-Year-Old Female

YONATHAN DANIEL, MD'24; IDIRIS MOHAMED; AARON P. WHEELER, MD

ABSTRACT

We report a case of a 62-year-old female presenting with shortness of breath, who was subsequently diagnosed with Austrian syndrome. The patient had a complicated clinical course, including invasive central nervous system pneumococcal disease, pneumococcal bacteremia, and mitral valve vegetation with possible leaflet perforation. Despite aggressive treatment, her condition continued to worsen. We will discuss the clinical features of this disease, approaches to diagnosis and treatment, and outcomes in light of this rare condition.

KEYWORDS: Austrian syndrome, Streptococcus pneumoniae, infective endocarditis, meningitis, pneumococcal vaccination

INTRODUCTION

Austrian syndrome is a rare triad of pneumonia, endocarditis, and meningitis caused by Streptococcus pneumoniae. Prompt recognition and aggressive treatment are crucial for reducing morbidity and mortality. Here, we present a case of a 62-year-old female who developed Austrian syndrome, and we discuss the challenges encountered in her management.

CASE PRESENTATION

A 62-year-old female with a past medical history of asthma, hypretension and morbid obesity presented for worsening shortness of breath and wheezing. She reported a three-day history of nonproductive cough, sweating and dyspnea that was frequently triggered by thoughts of her recently departed grandson. She otherwise denied chest pain, palpitations, headaches, abdominal pain, and changes in bowel or urinary habits. She had no history of PPSV-23, PCV-20, or PCV-15 vaccination and was not on home oxygen. She reported recently running out of her albuterol rescue inhaler but was otherwise adherent to her daily controller inhaler. On EMS arrival, she was hypoxemic with an oxygen saturation of 84%, which subsequently improved to 97% following the administration of two doses of nebulized Ipratropium Bromide 0.5 mg and Albuterol Sulfate 2.5 mg enroute to the Emergency Department (ED).

In the ED, her initial blood pressure was 127/83 mmHg, heart rate 116 bpm, and oxygen saturation 97% on room air. She was afebrile, and initial laboratory studies were notable for an elevated high-sensitivity troponin of 70 ng/L, with repeat increasing to 1209 ng/L without chest pain, and hypokalemia. Her white blood cell count was 5,600 cells/µL and a chest X-ray demonstrated patchy opacities in the right lung. Physical examination revealed a morbidly obese patient with clear lungs, moderately increased work of breathing, regular heart rate and rhythm, and no focal neurological deficits. An initial EKG showed sinus rhythm with mild ST depressions in the high lateral leads, and a subsequent EKG showed sinus rhythm with nonspecific T-wave inversions and flattening in the inferior leads. The patient was treated in the ED for an asthma exacerbation and admitted to the general medical floor overnight for further management of her dyspnea and Non-ST-elevation myocardial infarction (NSTEMI).

Following admission, steroids were discontinued owing to lack of clinical evidence of an acute asthma exacerbation or hypoxemic respiratory failure, and a 48-hour heparin infusion was initiated given the elevated troponin. Cardiology was consulted and a transthoracic echocardiography (TTE) was performed, revealing a 14 mm x 10 mm abnormal mass on the posterior mitral valve, raising suspicion for fibroelastoma, endocarditis, or valvular calcification. A left-heart catheterization was being considered, dependent upon her troponin trend. On hospital day two, the patient experienced diaphoresis, nausea, confusion, and was found to have a white blood cell count of 30,000 cells/µL. Infectious disease was consulted. She was still afebrile, but given her TTE findings and leukocytosis, vancomycin and ceftriaxone were initiated for presumed endocarditis, and blood and urine cultures were obtained. Throughout the day, her mental status continued to deteriorate, and a CT of the brain and repeat chest X-ray were obtained, both with no acute findings. Over the next 48 hours, her mental status continued to decline, initially as worsened confusion, then confusion with agitation, and finally somnolence with episodic agitation. Her white blood cell count increased to 39,000 cells/µL, and blood cultures grew gram-positive cocci. Ceftriaxone was increased to CNS dosing (2 g every 12 hours), and a lumbar puncture and brain MRI were planned to evaluate viral encephalitis or meningitis. Acyclovir (10 mg/kg every 8 hours) was added, and repeat cultures were drawn.

On hospital day four, she began spiking fevers (38.4 C) and became tachycardic and tachypneic, ranging from 110–130 bpm and 28–60 breaths/min, respectively. Initial blood cultures speciated to streptococcal pneumoniae, and her repeat cultures remained negative. A lumbar puncture and MRI were unable to be obtained given her agitation and hemodynamic instability, and she was subsequently transferred to the Medical Intensive Care Unit for sedation and elective intubation. Cerebral spinal fluid (CSF) analysis showed 238 nucleated cells, 56% PMNs, high protein, low glucose, and gram-positive cocci, consistent with bacterial meningitis. Antibiotics were broadened to include ampicillin (2 g every 4 hours). An MRI of the brain revealed findings consistent with florid meningitis, ventriculitis, and possible ischemic infarcts.

The patient was transferred to the Neuro Critical Care Unit at Rhode Island Hospital for neurosurgical evaluation and monitoring. Repeat MRI demonstrated progression of cerebritis and ischemic infarcts, and CT angiogram of the head and neck supported invasive pneumococcal disease with CNS progression. Repeat TTE showed a 19 mm x 12 mm partially mobile mass visualized on the posterior mitral valve, most consistent with vegetation in the setting of bacteremia. Compared to the TTE on admission, mitral insufficiency was better appreciated, possibly due to leaflet perforation and worsening of insufficiency due to infection progression. The final recommended treatment plan consisted of ceftriaxone (2 g every 12 hours) for a total of 28 days; however, given her very poor prognosis, she was transitioned to comfort measures only, and she passed away one day after extubation.

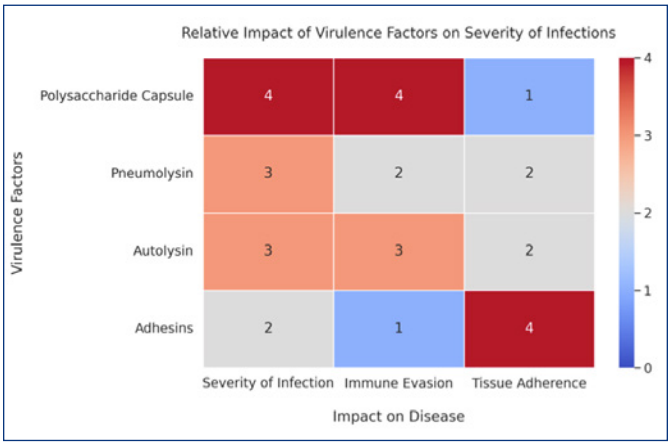
DISCUSSION

First identified in the 19th century, Austrian syndrome refers to a combination of three conditions – pneumonia, meningitis, and endocarditis – that often occur together following a Streptococcus pneumoniae (S. pneumoniae) infection.[1] This trio of ailments, also known as Osler's triad, historically had a mortality rate of 75%. The syndrome is more prevalent among individuals with alcohol use disorders, particularly in men, and was historically linked to alcoholism as part of a four-condition set.

S. pneumoniae presents unique challenges in treatment due to its virulence factors and ability to cause rapid, severe disease. One of the key characteristics that sets S. pneumoniae apart from other gram-positive organisms, such as Staphylococcus, is its polysaccharide capsule, a major virulence factor which allows the bacteria to evade the host's immune response and establish infection.[2] Moreover, certain capsular types have been associated with a higher frequency of nasopharyngeal colonization, potentially increasing the risk of developing severe infections. S. pneumoniae adheres to and invades host tissues, releases pneumolysin that damages host cells, and produces autolysin that leads to rapid bacterial lysis, resulting in a strong inflammatory response.[3] (See **Figure 1**.) Early identification and aggressive treatment are critical for reducing the morbidity and mortality associated with Austrian syndrome.[1] Current CDC guidelines emphasize the importance of pneumococcal vaccination for prevention; the routine administration of a one-time vaccination of PCV-20, or PCV-15 followed by PPSV-23, is recommended in all adults aged 19 to 64 with no history of pneumococcal vaccination or unknown vaccination history. In those with immunocompromising conditions, the CDC recommends an additional one-time dose of PCV-20 or PPSV-23 at least five years after completion of vaccinations.[10] There was an ongoing outpatient workup for hypogammaglobulinemia in our patient, which could have further predisposed her to invasive pneumococcal disease via humoral dysfunction, though this was not conclusively determined due to the patient's deferral of the diagnostic process. This case emphasizes the diagnostic challenges and management complexities associated with this rare condition, as well as the importance of lifelong healthy living and adherence to medical recommendations. Our patient's clinical course was complicated by her underlying medical conditions, including morbid obesity, asthma and hypertension, as well as her lack of pneumococcal vaccination, all of which likely predisposed her to invasive pneumococcal disease.[3]

Management of Austrian syndrome primarily focuses on the prompt initiation of appropriate antimicrobial therapy, with high-dose intravenous penicillin or ceftriaxone being the preferred treatments, and rifampicin if the bacterial isolate is resistant to cephalosporins.[4] Before the 1940s, S. pneumoniae was the cause of 15–20% of all endocarditis cases, but with the introduction of penicillin and pneumococcal vaccinations, the epidemiology of these infections shifted significantly. Today, S. pneumoniae accounts for less than 2% of endocarditis cases.[5] This underscores the role that antibiotic resistance plays in complicating treatment.

Figure 1. Heatmap depicting relative contributions of S. pneumoniae virulence factors to infection severity, immune system evasion, and tissue adherence.



Despite the initiation of broad-spectrum antibiotics, patients can rapidly deteriorate, as was observed in our patient.[4] Obtaining early and accurate culture and susceptibility data is especially important in guiding therapy.[3,6]

Our case highlights several valuable teaching points that may serve to improve the management and outcomes of patients with similar presentations. First, the diagnosis of meningitis must be considered even with minimal alteration of mental status with or without leukocytosis, especially if bandemia is present.[2] This went unrecognized in our patient because the initial changes in mental status were attributed to concurrent acute cystitis, and while the antibiotic type was promptly initiated, there was a delay in starting CNS dosing. Early suspicion and appropriate investigations, including lumbar puncture and brain imaging, are crucial to promptly diagnose and treat meningitis to minimize adverse outcomes.[7]

Second, our patient exhibited mostly neurological symptoms without any concomitant major cardiopulmonary symptoms, at least during the first week of her hospitalization, and did not have most of the classic risk factors.[5] As a result, the possibility of concurrent pneumococcal meningitis and endocarditis was not considered until later in the hospital course. This atypical presentation highlights the importance of maintaining a high index of suspicion for invasive pneumococcal disease in patients with unexplained neurological symptoms, even in the absence of traditional risk factors or overt cardiopulmonary manifestations.[8]

The literature on Austrian syndrome discusses the need for prompt surgical valve replacement, as studies suggest that only 17% of endocarditis cases respond successfully to medical treatment alone.[9] Nevertheless, the choice to move forward with surgery should be tailored to each individual situation, factoring in the patient's overall health status and prognosis. Given our patient's poor prognosis and rapid clinical decline, a conservative approach was chosen and the focus shifted to providing palliative care and, eventually, comfort care.

CONCLUSION

Austrian syndrome presents significant diagnostic and management challenges due to its rarity and nonspecific clinical features. Our case emphasizes the importance of maintaining a high index of suspicion for invasive pneumococcal disease, particularly in patients with unexplained neurological symptoms, and stresses the consideration of meningitis even with minimal alteration of mental status. Early recognition, aggressive antimicrobial therapy, and preventive vaccination are essential for reducing morbidity and mortality. This case serves as a reminder for clinicians to be vigilant for Austrian syndrome in patients presenting with pneumonia, endocarditis, and meningitis, and emphasizes the importance of vaccination against S. pneumoniae to prevent invasive pneumococcal disease and its complications.

References

1. Atkinson K, Augustine DX, Easaw J. Austrian syndrome: a case report and review of the literature. Case Rep. 2009; 2009:bcr0320091724.
2. Musher DM, Groover JE, Reichler MR, et al. Emergence of antibody to capsular polysaccharides of Streptococcus pneumoniae during outbreaks of pneumonia: association with nasopharyngeal colonization. Clin Infect Dis. 1997;24(3):441-446. doi:10.1093/clinids/24.3.441
3. van der Poll T, Opal SM. Pathogenesis, treatment, and prevention of pneumococcal pneumonia. Lancet. 2009;374(9700):1543-1556. doi:10.1016/S0140-6736(09)61114-4
4. Baddour LM, Wilson WR, Bayer AS, et al. Infective Endocarditis in Adults: Diagnosis, Antimicrobial Therapy, and Management of Complications: A Scientific Statement for Healthcare Professionals From the American Heart Association [published correction appears in Circulation. 2015 Oct 27;132(17):e215] [published correction appears in Circulation. 2016 Aug 23;134(8):e113] [published correction appears in Circulation. 2018 Jul 31;138(5):e78-e79]. Circulation. 2015;132(15):1435-1486. doi:10.1161/CIR.0000000000000296
5. García-Cabrera E, Fernández-Hidalgo N, Almirante B, et al. Neurological complications of infective endocarditis: risk factors, outcome, and impact of cardiac surgery: a multicenter observational study. Circulation. 2013;127(23):2272-2284. doi:10.1161/CIRCULATIONAHA.112.000813
6. Daudin M, Tattevin P, Lelong B, et al. Characteristics and prognosis of pneumococcal endocarditis: a case-control study. Clin Microbiol Infect. 2016;22(6):572.e5-572.e5.72E8. doi:10.1016/j.cmi.2016.03.011
7. Brouwer MC, Tunkel AR, van de Beek D. Epidemiology, diagnosis, and antimicrobial treatment of acute bacterial meningitis. Clin Microbiol Rev. 2010;23(3):467-492. doi:10.1128/CMR.00070-09
8. Aronin SI, Mukherjee SK, West JC, Cooney EL. Review of pneumococcal endocarditis in adults in the penicillin era. Clin Infect Dis. 1998;26(1):165-171. doi:10.1086/516279
9. Vuille C, Nidorf M, Weyman AE, Picard MH. Natural history of vegetations during successful medical treatment of endocarditis. Am Heart J. 1994;128(6 Pt 1):1200-1209. doi:10.1016/0002-8703(94)90752-8
10. Kobayashi M, Pilishvili T, Farrar JL, et al. Pneumococcal Vaccine for Adults Aged ≥19 Years: Recommendations of the Advisory Committee on Immunization Practices, United States, 2023. MMWR Recomm Rep 2023;72(No. RR-3):1–39. DOI: http://dx.doi.org/10.15585/mmwr.rr7203a1

Authors

Yonathan Daniel, MD'24,The Warren Alpert Medical School of Brown University, Providence, RI.

Idiris Mohamed, Department of Computer Science, College of Computer, Mathematical, & Natural Sciences, University of Maryland, College Park, MD.

Aaron P. Wheeler, MD, Assistant Professor of Medicine, Clinician Educator, The Warren Alpert Medical School of Brown University; Division of Hospital Medicine, The Miriam Hospital, Providence, RI.

Disclosures

No conflict of interest or financial disclosures.

Correspondence

Yonathan Daniel

Box G-9339, Brown University, Providence, RI 02912-G

Yonathan_daniel@brown.edu