

# Austrian Syndrome – A Rare Clinical Triad

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## ABSTRACT

Austrian syndrome is the clinical triad of endocarditis, meningitis, and pneumonia secondary to *Streptococcus pneumoniae*. It is an uncommon but serious illness that requires clinical suspicion in an at-risk population in order to guide further workup and treatment. Here we present a case of a Wisconsin resident who illustrates the severity of the disease and how certain elements of this triad may be delayed in clinical presentation.

## INTRODUCTION

*Streptococcus pneumoniae* may cause bacteremia in both immunocompetent and immunocompromised individuals. It is the most commonly isolated organism in bacterial meningitis, otitis media, pneumonia, and sinusitis.<sup>1,2</sup> Although the incidence of pneumococcal disease has declined following the introduction of pneumococcal vaccines, *S pneumoniae* remains the most commonly cultured organism in bacterial pneumonias (38%) in hospitalized patients.<sup>3</sup> Vaccinated patients who are immunocompromised have increased risk of disease and may develop disease secondary to serotypes not covered by the vaccines.<sup>4</sup> Disseminated disease can result in the clinical triad of pneumococcal endocarditis, meningitis, and pneumonia – also known as Austrian syndrome.

In 1957, Robert Austrian described a series of 8 patients who

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developed the clinical triad that now bears his name.<sup>5</sup> Since then, additional single case reports and small series have added to our knowledge of this rare syndrome.<sup>6-9</sup> Most reports describe pneumonia as the initial illness, followed by multisystem involvement.<sup>10,11</sup>

Unfamiliarity with this syndrome frequently leads to a delay in diagnosis, with an average time from symptom onset to diagnosis of 5 days.<sup>9</sup> Clinical suspicion,

especially in immunocompromised individuals, provides the opportunity for earlier treatment. The diagnosis of Austrian syndrome also may modify dosage, duration, and choice of antibiotics. Here we present a case report of a patient in Wisconsin diagnosed with Austrian syndrome and discuss its diagnosis and treatment.

## CASE PRESENTATION

In January 2020, a 58-year-old man with untreated chronic hepatitis C and polysubstance use disorder including intranasal heroin, alcohol (4-5 oz/day), and tobacco presented to an outside emergency department in respiratory distress. He was in his usual state of health until 2 weeks prior when he began to develop progressive fevers up to 39.5°C, chills, nausea, and vomiting. He became short of breath and, upon presentation to the hospital, had a blood pressure of 85/49 and an O<sub>2</sub> saturation of 82% on room air.

He was treated initially with broad-spectrum antibiotics, which included vancomycin, ceftriaxone, and piperacillin-tazobactam; fluids, vasopressors, and bilevel positive airway pressure (BiPAP). Chest imaging showed multifocal left-sided pneumonia (Figure). His acute hypoxic respiratory failure progressed rapidly, leading to intubation and transfer to our institution. His white blood cell count was 5.3; however, his immature granulocyte count was elevated to 170 (normal range 0-50/μL). His albumin was low at 1.4

g/dL, and his aspartate aminotransferase (AST) was elevated at 240 U/L. His brain natriuretic peptide was normal, and influenza polymerase chain reaction (PCR) was negative.

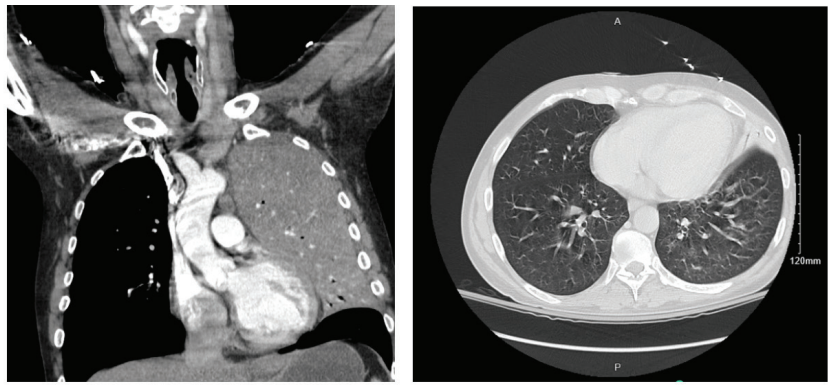
The patient remained hypotensive requiring vasopressors. On hospital day 2, his initial blood cultures and sputum cultures grew *S pneumoniae* sensitive to ceftriaxone. Given bacteremia and persistent, recurrent fevers, there was concern for pneumococcal meningitis. A lumbar puncture was performed and showed 3,200 nucleated cells, low glucose, and elevated protein; and a gram stain of the cerebrospinal fluid identified gram positive cocci in pairs. Additional bacteremia workup included an echocardiogram later on admission day 2 that demonstrated a decreased ejection fraction and severe aortic regurgitation but no vegetations.

His antibiotics were narrowed to 2 grams of intravenous ceftriaxone every 12 hours. Dexamethasone was not initiated as he had already been on antibiotics for multiple days. His condition improved, and he was extubated on admission day 8. On admission day 18, he reported decreased hearing, along with tinnitus. Audiology and otolaryngology were consulted, and workup included head magnetic resonance imaging and temporal bone computed tomographic scan to exclude tumor and anatomic inner ear pathology. The etiology of his hearing loss was presumed secondary to pneumococcal meningitis. A follow-up echocardiogram on day 23 demonstrated an 8 mm x 2 mm vegetation on the mitral valve, in addition to the aortic regurgitation. With the presence of pneumococcal pneumonia, meningitis, and endocarditis, the patient was diagnosed with Austrian syndrome. With continued clinical improvement, he was transferred to a skilled nursing facility where he completed a 4-week course of ceftriaxone and subsequently returned home. His tinnitus resolved and hearing improved to the point where he did not require hearing aids or implants. Follow-up echocardiograms demonstrated persistent regurgitation from valvular damage, which led to eventual aortic and mitral valve replacement.

## DISCUSSION

*S pneumoniae* is a common human pathogen. Although the incidence of pneumococcal disease has declined since the introduction of pneumococcal vaccines, an increase in disease caused by pneumococcal serotypes not included in the vaccines has been observed.<sup>4</sup> Our patient was vaccinated with pneumococcal polysaccharide vaccine (PPSV-23) 2 years prior to presentation. We suspect that his illness was caused by his relatively immunocompromised host state from chronic, untreated hepatitis C and poly-

**Figure.** Chest Imaging at Initial Presentation



Coronal (left) and transverse (right) view of patient's computed tomography angiography (CTA) chest showing diffuse left upper lobe consolidation with inflammatory nodules.

substance abuse, although it may also have been caused by a strain not covered by PPSV-23.

In the critically ill patient with pneumococcal pneumonia and/or bacteremia, Austrian syndrome should remain in the differential, as it guides the need for additional workup for cardiac and central nervous system (CNS) involvement. In our patient, the suspicion of Austrian syndrome led to early echocardiogram and lumbar puncture. This is important because if meningitis is confirmed, CNS dosing would need to be instituted.<sup>12</sup> The presence of endocarditis would warrant 4 weeks of treatment rather than the 1 to 2 weeks used to treat pneumonia, bacteremia, or meningitis.<sup>13</sup>

Initially, the clinical triad of pneumococcal endocarditis, meningitis, and pneumonia may be difficult to confirm, as in our case. Notably, early intubation and sedation can obscure potential neurologic symptoms, and echocardiographic evidence of a vegetation may be delayed.<sup>13</sup> In our case, an initial transthoracic followed by transesophageal echocardiogram showed aortic regurgitation but failed to show a valvular vegetation. Given our suspicion of Austrian syndrome and the possibility that an early echocardiogram can miss a vegetation,<sup>13</sup> these negative studies were followed up with repeat studies at 4 weeks. The follow-up study demonstrated a vegetation.

Austrian syndrome should also remain in the differential due to risk for longstanding neurologic damage. Our patient developed sensorineural hearing loss absent treatment with ototoxic drugs, which may have been secondary to his meningitis. Empiric corticosteroids may have mitigated this outcome;<sup>14</sup> however, the success of corticosteroids is associated with their initiation prior to or at the time of initial antibiotic administration.<sup>15</sup> Our patient was on day 2 of antibiotics prior to the diagnosis of meningitis, therefore corticosteroids were not administered.

In addition, diagnosis of pneumococcal endocarditis alerts the clinician to the possibility of longstanding valvular dysfunction.<sup>16</sup>

Our patient demonstrated persistent regurgitation and compromise of cardiac function, which eventually necessitated aortic and mitral valve replacement.

Austrian syndrome is more common in individuals with alcohol dependence, splenectomy, and preexisting heart disease.<sup>6,7,17,18</sup> In the patient with pneumococcal pneumonia, early detection of additional organ involvement through lumbar puncture and echocardiography may shorten the delay in diagnosis that is typical of Austrian syndrome. An ongoing index of suspicion is critical in the absence of confirmation. Our patient and previous reports have highlighted the delayed appearance of cardiac manifestations.<sup>6</sup> Until culture-positive growth and susceptibility have been determined, invasive pneumococcal disease should be treated with combination antibiotic therapy (eg, vancomycin for meningitic coverage and a third-generation cephalosporin) rather than monotherapy.<sup>19</sup>

## CONCLUSION

The triad of endocarditis, meningitis, and pneumonia secondary to *S pneumoniae* is an uncommon syndrome and requires a high index of suspicion and recognition of an at-risk population. This case of Austrian syndrome in a Wisconsin resident highlights the typical presentation, clinical course, complications, and treatment of this serious illness. In addition, it highlights the importance of entertaining this diagnosis to guide further workup, antibiotic selection, and treatment duration.

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