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Anaplasmosis-Related Fatality in Vermont: A Case Report

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Abstract

Human granulocytic anaplasmosis is an acute febrile tick-borne illness caused by the bacterium *Anaplasma phagocytophilum*. An anaplasmosis-related fatality in a Vermont resident with multiple comorbidities is described. Clinicians should be aware of the risk factors for severe outcomes of this emerging disease and promptly treat when suspected.

Keywords

anaplasmosis; *Anaplasma phagocytophilum* ; Vermont; tick-borne disease; *Ixodes scapularis*

Human granulocytic anaplasmosis is an acute febrile illness caused by the bacterium *Anaplasma phagocytophilum*. In the United States, anaplasmosis is transmitted by the bite of infected *Ixodes scapularis* ticks, and more rarely through blood transfusion and organ transplantation (Biggs et al. 2016). The incidence of anaplasmosis is highest in the northeastern and upper midwestern United States. In Vermont, the number of reported cases of anaplasmosis nearly doubled each year during 2012–2017, an increase of 2347% (17 cases in 2012 to 399 cases in 2017) (Vermont Department of Health 2018). Similar increases and geographic range expansions of human cases were observed in neighboring states of Maine and New York (Elias et al. 2020, Russell et al. 2021).

Anaplasmosis is often self-limited, with a case fatality rate of 0.3% for those who receive treatment, but hospitalization rates are as high as 31% among all patients with anaplasmosis (Dahlgren et al. 2015, Biggs et al. 2016). Risk factors for a more severe course of illness include advanced age, immunosuppressive comorbidities such as diabetes and cancer,

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Ethics Statement

This case report was deemed exempt from Institutional Review Board review.

Disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

Author Disclosure Statement

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and delay in diagnosis and treatment. To alert clinicians to the severe manifestations of this emerging disease and encourage prompt recognition and treatment, we describe an anaplasmosis-related fatality in a Vermont resident.

Case Description

In April 2019, an 89-year-old man presented to the emergency department with a chief complaint of weakness that began about a week before presentation. The patient also reported chills and myalgia, and he had multiple comorbidities, including end-stage renal disease with a history of renal cancer and nephrectomy, congestive heart failure, paroxysmal atrial fibrillation, and hypertension. He had been living independently, and frequently spent time outdoors. His vital signs were temperature 37.8° C, heart rate 140 beats/min, respiratory rate 16 breaths/min, and blood pressure 112/54 mm Hg. He was alert and oriented, with diminished breath sounds in both lung bases, a soft nontender abdomen, and a body mass index of 17.8 kg/m^2.

An electrocardiogram showed alternating atrial flutter and atrial fibrillation. Laboratory results were white blood cell (WBC) 4200/mm^3 (79% neutrophils and 13% bands, with neutrophilic inclusions consistent with morulae), hematocrit 32.9%, platelet count 27,000/μL, blood urea nitrogen 82mg/dL, creatinine 6.84mg/dL, C-reactive protein concentration 125 mg/L, and erythrocyte sedimentation rate 31 mm/h. Serum hepatic enzyme concentrations were within normal limits. The results of the tick-borne disease panel were positive PCR for A. *phagocytophilum*, negative PCR for *Babesia microti*, and positive antibody assays for *Borrelia burgdorferi*. Blood cultures were obtained, oral doxycycline 100 mg twice daily was initiated, and the patient was hospitalized.

On the second day of hospitalization (HD2), an echocardiogram demonstrated an ejection fraction of 50–55%, mild–moderate mitral regurgitation, and moderate–severe tricuspid regurgitation. On third day of hospitalization (HD3), he was noted somnolent, with profound dysphagia, dry mucous membranes, and decreased breath sounds bilaterally, and was diagnosed with acute encephalopathy. On fourth day of hospitalization (HD4), magnetic resonance imaging of the brain to evaluate for ischemia showed no acute findings. The family requested do-not-resuscitate and do-not-intubate orders.

Blood cultures obtained at time of admission were reported as no growth at 5 days. A chest X-ray (CXR) showed possible bibasilar infiltrates. On seventh day of hospitalization (HD7), a percutaneous endoscopic gastrostomy (PEG) tube was placed for nutritional support. On the ninth day of hospitalization (HD9), the patient decompensated and was transferred to the intensive care unit with acute respiratory failure.

A CXR showed worsening multifocal parenchymal opacities in the lower lung fields bilaterally. The WBC was 18,200/mm^3 (94.5% neutrophils) and the platelet count was 138,000/μL. The patient developed hypotension unresponsive to fluid administration. An attempt to place a central line was unsuccessful and complicated by a right-sided pneumothorax requiring chest tube placement. The patient self-extricated the PEG tube; attempts to reinsert were unsuccessful, with resultant pneumoperitoneum.

The family requested comfort care for the patient. He developed agonal breathing and was declared deceased the same day he was admitted to ICU. Blood cultures obtained on the day of death were no growth at 5 days. The death certificate listed the cause of death as septic shock, due to peritonitis, secondary to end-stage renal disease requiring hemodialysis.

Discussion

Although many factors ultimately led to the demise of this patient, his initial illness necessitating hospitalization was PCR-confirmed anaplasmosis. Although exact timing of exposure is unknown, the patient reported weakness that began a week before presentation, indicating a delay in initiation of treatment. Upon admission, prompt treatment with doxycycline likely addressed his anaplasmosis, as evidenced by improved thrombocytopenia. However, complications during hospitalization, including encephalopathy and pneumonia, eventually led to his death. The patient also had many of the risk factors known to contribute to severe outcomes related to anaplasmosis, including older age and comorbidities.

The incidence of anaplasmosis increases with age, and is highest among those aged ≥ 60 years (Dahlgren et al. 2015). Although lung involvement is rare, manifestations of pneumonitis and acute respiratory distress syndrome have been documented (Remy et al. 2003, Kaphle et al. 2015). It is unclear whether this patient's pneumonia was caused by anaplasmosis or acquired during hospitalization. However, the timeline supports anaplasmosis as the cause of his encephalopathy and provided the opportunity for in-hospital decompensation.

This is the first death related to anaplasmosis reported in Vermont and among only a few described in the literature (Zhang et al. 2008, Tsiodras et al. 2017, Goel et al. 2018). Clinicians in hyperendemic areas should be aware of this emerging disease and its more severe presentations, such as pneumonitis and septic shock. Presumptive treatment with doxycycline is recommended upon suspicion of anaplasmosis and other tick-borne rickettsial diseases. For example, patients with Rocky Mountain spotted fever treated before the fifth day of illness are less likely to die than those treated later in the course of illness (Biggs et al. 2016). Prompt recognition and early treatment, especially in persons at higher risk for severe outcomes, should help reduce the morbidity and mortality associated with this disease.

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