

Rare case of Tick borne Human Granulocytic Anaplasmosis in Georgia

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Abstract

Background: Human granulocytic anaplasmosis is a tick-borne illness that commonly presents with fever, leukopenia, thrombocytopenia, and elevated transaminases. Diagnosis can be challenging when gastrointestinal symptoms predominate, there is no recalled tick bite, or the patient lives in an area where anaplasmosis is less commonly reported.

Case Presentation: A 60-year-old previously healthy man from Georgia presented with 4–5 days of fever, arthralgias, nausea, vomiting, and diarrhea with poor oral intake. He initially attributed his symptoms to foodborne illness. He denied rash or a known tick bite but reported frequent deer hunting and handling, with recent outdoor exposure in Alabama. Laboratory evaluation showed leukopenia with a left shift, thrombocytopenia of $85 \times 10^3/\mu\text{L}$, hyponatremia, and elevated transaminases. Abdominal imaging showed no acute source of infection. Given his exposure history and laboratory findings, a tick-borne illness was suspected. Peripheral blood smear revealed morulae within neutrophils, raising concern for anaplasmosis. Empiric doxycycline was started while confirmatory testing was pending, with subsequent clinical improvement.

Conclusion: This case highlights the importance of considering anaplasmosis in patients with acute febrile illness, cytopenias, and transaminitis despite the absence of a known tick bite or residence in a typical endemic region. Careful exposure history and recognition of morulae on peripheral smear can provide important early clues and allow prompt initiation of treatment.

Keywords: Human granulocytic anaplasmosis, tick-borne illness, leukopenia, thrombocytopenia.

Clinical Case

60-year-old male with no pertinent past medical history who presents to the ED with worsening fevers and intractable nausea/vomiting/diarrhea. Patient reports symptoms began on Wednesday after reflection. Initially felt this was attributable to a chicken sandwich from burger King on Friday which he took only a few bites of and then became concerned with food-borne illness; however, this is incongruent with his symptoms after he reflected. He endorses diarrhea/nausea/vomiting with poor by mouth intake associated with such and an intolerance to even oral fluids. Endorses joint aches and fevers. Initially thought that this was associated with being 60 years old but acuity along with acute GI illness elevated his concern. Denies headache, vision changes, chest pain, shortness for breath, cough, abdominal pain or discomfort, rashes, easy bruising or other skin changes, no known tick bite. He felt bad Sunday and took some NyQuil to rest in his recliner, however his wife encouraged him to present to ED.

ED workup notable for neutropenia 3.9 with left shift, normal hemoglobin of 16, PLT of 85, sodium 131, AST/ALT of 111/86 respectively, T bili of 1.5, normal ALP, normal creatinine, BUN, glucose, negative respiratory viral panel. Urinalysis dark yellow and turbid with high specific gravity and 300 protein, very low pyuria, microscopic hematuria, 4+ mucus, 3 granular casts. CT abdomen/pelvis was grossly unremarkable except for colonic diverticulosis, fatty liver, right lung patchy atelectasis versus mild PNA. Abdominal ultrasound shows contracted gallbladder with probable sludge, thickened wall which may appear more thickened because of contraction rather than acute pathology, mild hepatic steatosis.

Because of fever, leukopenia, thrombocytopenia, tachycardia ED had elevated concern for possible tick-borne illness and initiated patient

on doxycycline which would also cover possible PNA seen on CT. Requesting admission for further workup and monitoring giving SIRS criteria met on presentation. Send out labs for tick-borne illness were also obtained (early ketosis, anaplasmosis). Travel and occupational history: Hunts whitetail deer in Marion county, cleans and prepares deer himself but states he's careful to avoid any exposures because of knowledge around tick-borne/deer associated illnesses. Did go Arrowhead hunting in Alabama approximately 2 weeks ago. No other pertinent travel history, primarily stays in Marion County. Has worked 30 years as a welder, denies exposure to galvanized metals. Is fairly consistent with wearing respirator at work.

Social history: Former smoker, reports history of heavier drinking in the past. Presently drinks 1-2 times per month, typically liquor. Occasionally will by a 6 pack of beer which will last him roughly one-week. Smokes marijuana 1-2 times per month, no other recreational drug use. Denies IV drug use or association with needles. Consume smokeless tobacco regularly (dip) with 1 tin lasting him 4-6 days. Monogamous with wife. Does not case others or share drinks with others. Relatively fastidious with handwashing. He has not seen a doctor in 10+ years. Takes no prescription medications or over-the-counter medications with irregularity. CT abdomen Pelvis revealed no evidence of acute intra-abdominal abnormality, but revealed fatty liver, colonic diverticulosis and right lung base patchy atelectasis. US Abdomen showed Contracted gallbladder with probable sludge and apparent wall thickening up to 7 mm. No additional sonographic findings of acute cholecystitis. Mild hepatomegaly with increased hepatic echogenicity, most commonly reflecting hepatic steatosis. No biliary ductal dilatation identified. Common bile duct measures approximately 4 mm where visualized.

60-year-old male with no past medical history presenting for 4-5 day history of fevers, progressively worsening nausea/vomiting/diarrhea,

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admitted for SIRS criteria with possible tick-borne illness versus immunosuppression. Multiple labs came back negative. Some of the labs like earlier ketosis have been ordered which takes weeks to come back. Case discussed with infectious disease who suggested 14 days of doxycycline follow up as an outpatient. Patient's headache resolved this morning as well and advised to follow up as an outpatient with primary care physician or go to the closest emergency room if symptomatology worsens.

Introduction

Human granulocytic anaplasmosis (HGA) is a tick-borne infection caused by *Anaplasma phagocytophilum*, an intracellular bacterium that infects neutrophils and may appear as characteristic morulae on peripheral blood smear [1]. The infection is transmitted mainly by *Ixodes* ticks and occurs most commonly in the upper Midwest and northeastern United States. As a result, cases occurring outside these regions may not be immediately recognized [2].

HGA typically presents as an acute febrile illness with headache, myalgias, and malaise, while rash is uncommon. Gastrointestinal symptoms can also occur and, when prominent, may initially suggest a gastrointestinal or foodborne illness [3]. Laboratory findings such as leukopenia, thrombocytopenia, and elevated liver enzymes in a patient with an unexplained febrile illness should raise suspicion for HGA. Identification of morulae within neutrophils can provide an early diagnostic clue, although PCR remains an important confirmatory test [4]. Because delayed treatment can lead to severe disease, doxycycline should be started when HGA is clinically suspected rather than waiting for confirmatory testing [3].

We present a case of HGA in a previously healthy man who developed a predominantly gastrointestinal febrile illness without a recalled tick bite while living outside a classically endemic region, highlighting the diagnostic challenge of recognizing HGA when typical epidemiologic clues are absent.

Discussion

Our patient has classic clinical picture of tick-borne illness in the setting of past history of deer hunting in Georgia following which patient presented with fever, leukopenia, thrombocytopenia, elevated transaminases, tachycardia. Further work including CT scan, ultrasonography abdomen was unremarkable. The most pertinent finding was found in the peripheral smear where morulae (Clumps of organism) were noticed in the neutrophils, thus raising the suspicion for anaplasmosis. Although Black-Deer ticks were endemic to Georgia, Anaplasmosis is very rare to be seen in southern United States and is more endemic to Northeastern and Upper Midwestern United States. As anaplasmosis is very rare in Georgia, we take this opportunity to highlight and present this tick-borne illness.

Anaplasmosis is tick borne illness primarily transmitted by the *Ixodes* Scapularis, Deer Tick and *Ixodes pacificus* [5,6] It is also called as human granulocytic anaplasmosis (HGA) due to the fact that it primarily takes refuge in the granulocytes for initial nesting and replication [5]. It is known to be endemic to Midwestern and North eastern, United States and mostly seen in people with history of Deer Hunting in the months of June – July [7]. In addition to tick exposure, other modes of transmission reported include contact with blood of slaughtered deer and knife cuts during field dressing process of deer which internal organs were removed from the organism to cool the meat quickly to preserve the meat [8,9]. Rarely, Anaplasmosis has been reported to be transmitted by blood transfusion from donor previously diagnosed with human granulocytic anaplasmosis [10,11].

In a typical clinical setting, the patient will have recently deer hunting and might not have recalled his tick bite during the trip as reported by our patient [6]. Following a incubation period of 1-2 weeks, the patient presents with prodromal symptoms including fever, headache, diarrhea, myalgia and arthralgia [6,12]. Work up in this patient might reveal anemia, leukopenia, thrombocytopenia and transaminitis [6,13]. In few cases, there have been reports of clinical progression with patient experiencing clinical complications including pericarditis, myocarditis, acute renal failure, interstitial pneumonitis, pleural effusion, acute respiratory distress syndrome, meningitis, cerebral infarction encephalitis, rhabdomyolysis, and toxic syndrome [6,14,15]. The pathophysiological basis for systemic complications can be explained by infection of neutrophils followed by hyperimmune inflammatory response syndrome and macrophage activation syndrome with exaggerated secretion of chemokines, cytokines and interferon signaling pathways [6,14,16].

As diagnosis of anaplasmosis is suspected, confirmation of diagnosis can be performed by using indirect fluorescent antibody test and polymerase chain reaction [17-19]. Specific diagnosis entails utilization of Wright /Giemsa stains in the peripheral blood smear to demonstrate the presence of morulae in the neutrophils [17]. The treatment of choice of anaplasmosis is doxycycline for 14 days which had good clinical efficacy in shortening the clinical course, thus affording rapid clinical improvement and cure [18,19]. If doxycycline is contraindicated such as those including young patient, pregnancy, rifampicin can be considered as a therapeutic alternative [20]. Patients receiving timely antibiotic therapy are known to full therapeutic response with most patients experiencing full clinical recovery [20]. Supportive care of systemic complication is warranted in case-by-case basis. In the event of delayed diagnosis, older population and immunosuppressed patients are susceptible to severe systemic complications due to hyperactive inflammatory response [18].

Conclusion

In our patient, there is a concern for tick-borne infection due to his recent deer hunting history and patient symptomatology. This clinical presentation is concerning for potential anaplasmosis or ehrlichiosis based on frequent outdoors exposure from deer hunting, presentation of symptoms, including fever, tachycardia, leukopenia, end-organ dysfunction evidenced by elevated serum transaminases and elevated bilirubin. A high degree of clinical suspicion and increased awareness to its clinical symptoms, is essential for prompt work up initiation and treatment in these cases.

Declarations

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