CASE REPORT

A miraculous recovery: *Bartonella henselae* infection following a red ant bite

Pramod K. Guru,[1] Anjali Agarwal,[1] Ashley Fritz[2]

[1]Department of Critical Care Medicine, Mayo Clinic, Jacksonville, Florida, USA
[2]Department of Anesthesiology, Mayo Clinic, Jacksonville, Florida, USA

Correspondence to
Dr Pramod K. Guru,
guru.pramod@mayo.edu

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SUMMARY

Infections caused by the Bartonella species are responsible for the human diseases collectively called 'bartonellosis'. The clinically important human infections are mostly caused by the three species (eg, *B. bacilliformis, B. quintana and B. henselae*) of *Bartonella* out of the many progressively increasing identified species. *Bartonella henselae* transmitted by the arthropod vector, fleas, after cat bite is responsible for the rare multisystem cat scratch disease in humans. We present an extremely rare case of *B. henselae* contracted presumably through a red ant bite. The patient had a prolonged hospital stay for persistent encephalopathy due to delay in diagnosis and initiation of antimicrobial therapy. His hospital course was complicated by two episodes of pulseless electrical activity cardiac arrest related to pulmonary embolism. However, he recovered to his baseline status in the hospital with timely administration of systemic anticoagulation and antimicrobials. He was discharged home with no neurological deficits.

BACKGROUND

The importance of the accurate history and physical examinations in patient management is well known in the clinical practice of medicine. The timely cause-specific therapy for patients with cardiac arrest to achieve the best neurological outcome remains a challenge and necessity in day-to-day practice of critical care medicine. The case described below posed a diagnostic challenge at admission which resolved with revisiting the history with family members. It also exemplifies the timely appropriate therapeutic decision-making process resulting in an excellent clinical outcome.

CASE PRESENTATION

A 56-year-old male patient was transferred from another hospital for management of progressively worsening behavioural changes, somnolence and decreased alertness in early December 2016. His only other significant medical history included migraine and benign prostatic hyperplasia. He worked as a salesman in a small town in the southern part of the state of Georgia,USA and denied tobacco or alcohol abuse. He was exposed to domestic cats but denied cat bites or flea exposure. His family history was unremarkable. Ten days prior to presenting to the outside facility, he was bitten by an ant (southern georgian red fire ant, possible *Solenopsis xyloni*) on his right leg resulting in localised maculopapular rash (figure 1). He was prescribed oral amoxicillin by his primary care physician for suspicion of cellulitis. Three days after starting the oral antibiotics, he developed generalised maculopapular, pruritic rash (figure 2). The rash and pruritus improved gradually after discontinuation of amoxicillin and initiation of oral prednisone and antihistamine therapy. However, family noticed significant change in his behavioural patterns, including lethargy, poor sleep and appetite in subsequent days. Ultimately he was admitted to the hospital with help of emergency medical services for agitation, unsteady gait and lack of comprehension. He was haemodynamically stable and afebrile on admission. His physical examination was notable for fading maculopapular rash in the legs and back, and absence of any focal neurological deficits. Laboratory examinations for liver function, renal function, haematocrit, urine drug screen and cerebrospinal fluid (CSF) studies were normal. Imaging studies, such as CT scan of the head, chest radiograph and carotid Doppler, were normal. Due to persistent encephalopathy and suspicion of seizure in the electroencephalogram, the patient was transferred to our hospital. On arrival he was afebrile, haemodynamically stable with a Glasgow coma scale (GCS) of 9. Laboratory studies were remarkable for leucocytosis, elevated transaminases with normal coagulation profiles and respiratory acidosis. Repeat CSF studies, vasculitis markers and MRI of the brain were found to be non-diagnostic. He was managed symptomatically and had improved (GCS 12) but with fluctuating sensorium in the hospital.

Three days after admission to our hospital, the patient sustained a pulseless electrical activity (PEA) cardiac arrest in the hospital and required 10 mins of resuscitation before the return of spontaneous circulation. Postcardiac arrest care in the intensive care unit (ICU) included targeted temperature therapy with goal temperature of 36°C and mechanical ventilatory support. On revisiting the history with family members, encephalopathy possible due to *Bartonella henselae*, or other arthropod-related infections, was strongly entertained as part of the differentials. He was empirically started on intravenous doxycycline and serology was sent for arthropod borne diseases. As part of the investigations for a cause of PEA arrest, a CT angiography of the chest was obtained, which demonstrated bilateral pulmonary embolism with severe clot burden in the major pulmonary artery (figure 3). Doppler studies of the legs were negative for thrombus.

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Figure 1 Healing site (arrow marked) of red ant bite on the right leg.

He had a second PEA cardiac arrest in the interventional radiology suite before initiation of catheter-directed thrombolysis for his pulmonary embolism. In addition to advanced cardiac life support measures, systemic tissue plasminogen activator was administered during cardiopulmonary resuscitation process. The patient had return of spontaneous circulation after 17 minutes of arrest. Targeted hypothermia protocol was continued for 48 hours along with mechanical ventilation and anticoagulation.

Figure 2 Generalised rash on the back.

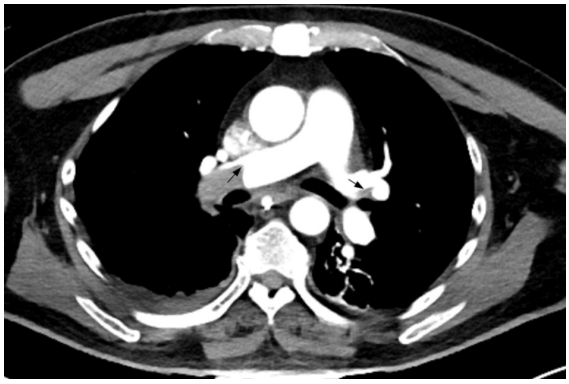

Figure 3 Coronal section of the chest CT angiography showing bilateral pulmonary arterial filling defects (large right main stem and small left segmental, marked by arrow) suggestive of pulmonary embolism.

INVESTIGATIONS

His serology, both immunoglobulin IgG (>1:1024, cut-off 1:256) and IgM (>1:20, cut-off <1:20) for *B. henselae* came back strongly positive. Serologic tests for Lyme disease, Q fever, *Ehrlichia, Anaplasma* and *Rickettsia* were negative.

DIFFERENTIAL DIAGNOSIS

The differentials considered during initial evaluations includes primary central nervous system infections such as meningoencephalitis, possible drug reactions, seizure disorder with persistent and prolonged postictal status, metabolic encephalopathy and possible autoimmune disorders.

TREATMENT

His initial antimicrobial therapy on admission to ICU included combination of vancomycin, piperacillin–tazobactum and doxycycline. We continued doxycycline therapy for a total of 4 weeks, and discontinued others after obtaining the serology report. The patient was weaned from the mechanical ventilatory support after 4 days. Therapeutic anticoagulation with heparin and subsequent bridging to oral coumadin was continued in the hospital. His subsequent hospital course was uneventful. His mental status returned to baseline prior to discharge on anticoagulation.

OUTCOME AND FOLLOW-UP

The patient is currently active and doing his normal household work without having any difficulties. Both the family and patient deny any residual neurological problems at 13 months of follow-up

DISCUSSION

There are two unique aspects of this case presentation: first suspected transmission of *B.henselae* by a red ant bite, and second the extraordinary successful clinical outcome despite two prolonged episodes of inhospital cardiac arrest. The infections caused by any *Bartonella* sp are collectively called bartonellosis.[1] Both the identification of this zoonotic Gram-negative, facultative intracellular bacterial pathogen and the diversity within its genus have increasingly been recognised and reported. Also, steadily increasing number of human diseases is linked to *Bartonella* sp

infection. *B. Quintana, B. bacilliformis and B. henselae* are the agents of trench fever, Oroya fever and cat scratch disease and are responsible for clinically significant disease in humans, respectively.[1 2] Blood-sucking arthropods are the vectors for transmission of *Bartonella* to mammalian hosts.[2] Humans are infected by the organism after a bite or scratch from flea-infested cats or potentially by Ioxdes spp ticks. The other reported sources of human transmission of *Bartonella* infections includes flea, dog and monkey bites, blood transfusion as well as pricks from thorns of plants and splinters.[2 3] Intraerythrocytic bacteraemia is the primary pathological process responsible for disease manifestations in most cases of *bartonellosis*.[1 2] Infected humans can be asymptomatic or present with non-specific symptoms. However, severe systemic disease often presents with fever, fatigue, generalised lymphadenopathy, neuroretinitis and encephalopathy. Encephalopathy is rare, with an incidence <2% and occurring most frequently in adolescents and adults.[4] A wide spectrum of atypical human disease manifestations have been described due to infection by *B. henselae*. The active and untreated infection might be responsible for the thromboembolic manifestations in our patient as reported in recent reviews. In literature search, we came across a single case report from Australia in which a 52-year-old woman had blurred vision and found to have papillitis and macular oedema after 3 days following a bull ant bite. The patient was presumed to have *B. henselae* infection based on the positive serology.[3] To the best of our knowledge, this is the first case of *B. henselae* infection manifesting as encephalopathy reported in the USA after an ant (southern georgian red fire ant) bite. The patient did not have any vision changes or lymphadenopathy, which could have been missed in the referring facility. In contrast, he had significant persistent encephalopathy. In the absence of any other explanations for the abnormal neurological manifestations, dramatic improvements of his mental status to baseline after therapy with antimicrobials and positive IgM titre with falling repeat IgG titre after 10 days to 1:512, we attribute his symptoms to *B. henselae* infection transmitted by the ant bite.

The other remarkable part of our case is the complete recovery of the neurological status despite two episodes of in-hospital cardiac arrest with prolonged resuscitation in the setting of pulmonary embolism. The overall survival with good neurological status has been improved in cardiac arrest patients over the past decade.[5] The primary reason for this success is the implementation of structured guidelines for cardiopulmonary resuscitation. Besides this, other interventions which have supplemented the results include: expedited coronary interventions in case of suspected coronary ischaemia, systemic thrombolysis for massive pulmonary embolism as the cause of arrest and improved postresuscitation care such as targeted temperature therapy.[6 7] This might hold true for our patient, as he received systemic thrombolysis during his second arrest and was also managed by hypothermia for 48 hours.

Learning points

- Although *Bartonella henselae* is traditionally transmitted through exposure to cats, fleas or dogs, it should be considered with exposure to arthropods such as ants.
- *B. henselae* should be included in the differential of encephalopathy especially when no other obvious diagnosis can be made.
- Timely identification of the cause and appropriate targeted therapy in patients with in-hospital cardiac arrest can be helpful to reduce both the short-term and long-term mortality and morbidity.

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REFERENCES

1 Breitschwerdt EB. Bartonellosis: one health perspectives for an emerging infectious disease. *Ilar J* 2014;55:46–58.
2 Regier Y, O Rourke F, Kempf VA. Bartonella spp. - a chance to establish One Health concepts in veterinary and human medicine. *Parasit Vectors* 2016;9:261.
3 Ullrich K, Saha N, Lake S. Neuroretinitis following bull ant sting. *BMJ Case Rep* 2012;2012:bcr2012006338.
4 Carithers HA, Margileth AM. Cat-scratch disease. Acute encephalopathy and other neurologic manifestations. *Am J Dis Child* 1991;145:98–101.
5 Goldberger ZD, Chan PS, Berg RA, *et al*. Duration of resuscitation efforts and survival after in-hospital cardiac arrest: an observational study. *Lancet* 2012;380:1473–81.
6 Mostafa A, Briasoulis A, Telila T, *et al*. Treatment of Massive or Submassive Acute Pulmonary Embolism With Catheter-Directed Thrombolysis. *Am J Cardiol* 2016;117:1014–20.
7 Sista AK, Horowitz JM, Goldhaber SZ. Four key questions surrounding thrombolytic therapy for submassive pulmonary embolism. *Vasc Med* 2016;21:47–52.