Case Report:
Spontaneous Splenic Rupture During Acute Parasitemia of *Babesia microti*

M. Kent Froberg,1 Devon Dannen,1 Nicholas Bernier,2 Wun-Ju Shieh,3 Jeannette Guarner,3,4 and Sherif Zaki3

1Department of Pathology, University of Minnesota, School of Medicine, and Duluth Clinic, Duluth, Minnesota; 2Department of Medicine, St. Joseph’s Medical Center, Brainerd, Minnesota; 3Infectious Diseases Pathology Branch, Division of Viral Rickettsial Diseases, Centers for Disease Control and Prevention, Atlanta, Georgia; and 4Department of Pathology & Laboratory Medicine, Emory University School of Medicine, Atlanta, Georgia

Abstract. *Babesia* is a malaria-like protozoan parasite spread by *Ixodes* ticks primarily from the white-footed deer mouse to humans. Typically it causes subclinical disease, but occasionally causes acute febrile disease with hepatosplenomegaly. We report a case of spontaneous splenic rupture of a 56-yr-old man with acute *Babesia microti* infection.

Keywords: rupture of spleen, babesiosis, *Babesia microti*

Case Report

A 56-yr-old man, who lived in the upper midwestern USA where babesiosis, Lyme disease and human granulocytic anaplasmosis (formerly termed erlichiosis) are endemic, presented to the Emergency Department at a local hospital during August with a 2-wk history of fever up to 103°F, chills, myalgia, and 10-pound weight loss. His history included hypertension controlled with Lisinopril, cigarette smoking, and bilateral inguinal hernia repair by laproscopic surgery two weeks prior to presentation. On physical examination, he had a palpable spleen without adenopathy. He had no skin rashes and denied any recent rashes or known tick bites. He had a low platelet count (73,200/mm³), and normochromic, normocytic anemia (blood hemoglobin, 12.5 g/dl). Given his clinical symptoms, he was thought to have anaplasmosis and was started on oral doxycycline therapy. Serum was collected for serologic studies for antibodies against *Anaplasma phagocytophilum* and *Borrelia burgdorferi*. A Giemsa stained thin film of peripheral blood was later reported as negative for morulae of *Anaplasma*. A monospot test was negative.

Despite the antibiotic therapy, his symptoms persisted and two days later he experienced acute abdominal pain and presented to the Emergency Department. His abdomen was tender with guarding, and he was nearly syncopal with a blood pressure of 78/46 mmHg. His platelet count was 37,000/mm³ and his hemoglobin was 9.3 g/dl. An abdominal CT scan demonstrated splenomegaly with evidence of splenic rupture and blood within the peritoneal cavity (Fig. 1). The patient denied any recent trauma. An emergency splenectomy was immediately performed.

The spleen weighed 754 g and had a large rent and hematoma along the convex surface. Microscopically, the red pulp was expanded, while the white pulp appeared normal. The red pulp contained numerous histiocytes showing erythro-
phagocytosis. No atypical infiltrates were identified and immunohistochemical studies performed on representative blocks of splenic tissue demonstrated a normal distribution of T and B lymphocytes with no evidence of clonal expansion. In situ hybridization for Epstein Barr Virus was positive in a rare splenic cell. Following splenectomy, the patient’s Giemsa-stained peripheral blood smear was examined microscopically and several Babesia merozoites were identified. Using Babesia microti specific primers, PCR performed on DNA extracted from the patient’s blood was positive using appropriate controls [1]. An immunohistochemical (IHC) study of formalin-fixed splenic tissue using a polyclonal antibody for Babesia species [2] was performed at the Centers for Disease Control and Prevention (CDC) and was positive (Fig. 2).

Additional IHC studies performed by the CDC on sections of spleen were negative for Bartonella henselae, Anaplasma phagocytophilum, and Neisseria meningitidis. The patient was started on clindamycin and quinine therapy and his symptoms resolved. Serologic studies for Anaplasma phagocytophilum were negative, while serum IgM and IgG for Borrelia burgdorferi were positive by EIA and Western blot (LabCorp, Kansas City, MO). Subsequent examination of Giemsa-stained peripheral blood failed to identify intra-erythrocytic piroplasms. The patient has remained clinically disease-free for more than one year after initial presentation.

Discussion

Babesiosis is a zoonotic emerging infectious disease primarily distributed along the northeastern seaboard and upper midwest of the United States where the tick vector, Ixodes scapularis, is endemic. In Minnesota, Lyme borreliosis is the most common tick-borne infection, followed by anaplasmosis and babesiosis according to data collected by the Department of Public Health of the State of Minnesota [3]. Outbreaks occur largely during summer months when people and ticks are most active. Patients with babesiosis usually experience subclinical infection, while symptomatic patients often present with flu-like illness with fever, fatigue, and chills [4].

Ixodes ticks may be simultaneously infected with Borrelia burgdorferi, Anaplasma phagocytophilum, and Babesia microti. The rate of coinfection with these agents in humans is variable with reports indicating a prevalence of 4 to 26% [5,6]. Coinfections of Borrelia burgdorferi and Babesia microti appear to be less common. Mitchel et al [7] found that 2.1% of residents of Wisconsin and Minnesota with culture-proven Lyme borreliosis...
had serologic evidence of acute babesiosis. Krause et al [5] reported that approximately 10% of Lyme disease patients in southern New England were co-infected with babesiosis, and that the number of symptoms and duration of illness were greater with co-infection than with either infection alone. This purportedly increased severity of symptoms related to co-infection has been disputed by subsequent studies in humans and laboratory animals [8,9].

Serologic testing of our patient indicated exposure to *Borrelia burgdorferi*, with positive IgG and IgM antibodies. Since IgM seropositivity may persist for months in Lyme patients, it is unclear when this patient was exposed. He had no current skin rashes, no evidence of arthritis, and had no evidence of active Lyme disease, suggesting that he had been exposed to *Borrelia burgdorferi*, but likely did not have a concurrent infection. We did not, however, perform PCR on blood from this patient using Borrelia-specific primers and it is possible the patient had subclinical *Borrelia* infection. Krause et al [5] demonstrated that patients co-infected with *Borrelia* and *Babesia* may be PCR-positive for the spirochete DNAs in blood for up to 265 days post-infection, suggesting a prolonged spirochemia in co-infected patients. Disease severity in babesiosis patients has been associated with increased age, absence of a spleen, or being immunocompromised. While our patient was 56 years of age, he had a previously intact spleen and had no known immunodeficiencies.

Splenomegaly may occur in patients with *Babesia microti* parasitemia and may be related to phagocytosis of *Babesia*-infected erythrocytes by splenic histiocytes as well as sequestration of platelets leading to thrombocytopenia [10]. Erythrophagocytosis was identified by routine microscopy in sections of spleen from our patient and many erythrocytes showed immunoreactivity to *Babesia* polyclonal antibodies suggesting that the intra-erythrocytic parasite and innate response to the parasite were responsible for the splenic enlargement and ultimate splenic rupture in our patient. Splenomegaly and subsequent splenic rupture have been rarely reported secondary to malaria infection, another vector-borne intra-erythrocytic parasite [11]. Since our patient did not report any abdominal trauma and gave no evidence of *Anaplasma phagocytophilum*, *Bartonella henselae*, or acute EBV infection, we conclude that the splenic rupture was likely due to rapid splenic enlargement due to sequestration of platelets and *Babesia*-infected red blood cells. This appears to be the first reported case of spontaneous splenic rupture associated with acute *Babesia* infection.

References