



Multiple Splenic Lesions on MRI as a Radiologic Manifestation of Babesiosis

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We showcase our 79-year-old female patient from Long Island, New York, who presented to the hospital in June 2023 with daily fevers, fatigue, generalized abdominal pain, intermittent nausea, anorexia, dark urine, and dry cough. The patient has a medical history of hypothyroidism, osteoporosis, and hepatitis C that was treated in 2019, and stage 0 ductal carcinoma in situ of the breast, for which she underwent lumpectomy in 2007. Our patient was found to have anemia with a hemoglobin of 7.9 g/dL (11.5–15.5 g/dL) and thrombocytopenia with platelets of 74,000/mm³ (150,000–400,000/mm³). Computed tomography (CT) abdomen and pelvis demonstrated a 1.4 cm hypodense right hepatic nodule, which was concerning for possible cholangiocarcinoma. Follow-up magnetic resonance imaging (MRI) abdomen and pelvis was performed and revealed the liver lesion to be benign appearing and unchanged from previous studies done in 2020. However, post-contrast T1-weighted MRIs showed mild splenomegaly (13.2 cm) with multiple ill-defined, hypoattenuating splenic lesions measuring up to 1 cm (►Fig. 1A and B). These splenic lesions were not visible on other sequences, including unenhanced T1-weighted, T2-weighted, and diffusion-weighted sequence. These lesions were new compared with previous MRI performed on December 9, 2020. In retrospect, the lesions were visible as subtle hypodense abnormalities on the recent CT scan (►Fig. 2). Peripheral blood smear with Giemsa stain found intraerythrocytic rings positive for *Babesia microti*, with <1% parasitemia. Polymerase chain reaction assay (PCR) of the patient's peripheral blood was done and was positive for *Babesia microti* and negative for Lyme, Ehrlichia, and Anaplasma. The patient was started on a 10-day course of atovaquone 750 mg twice a day and azithromycin 250 mg daily. Upon initiating treatment, the patient's bicytopenia and overall symptoms improved.

Babesia are malaria-like intraerythrocytic parasites that are transmitted by the *Ixodes scapularis* tick, which is typically carried by deer mice.^{1,2} The *Ixodes scapularis* tick is the same vector as *Borrelia burgdorferi*, which makes Lyme coinfection common.³ *Babesia* in the United States is endemic to the northeast and north midwestern regions, with New York being a state that consistently reports high numbers of babesiosis.⁴ Babesiosis can also be transmitted via blood products, which may lead to cases of babesia infection in nonendemic regions.³ Babesiosis is classically diagnosed on blood smear with Giemsa or Wright staining showing intraerythrocytic rings. While intraerythrocytic tetrad formations (“Maltese cross”) are pathognomonic for babesiosis, these are rare findings.¹ Peripheral blood smear also detects the percentage of parasitemia. Diagnosis can also be made via PCR of peripheral blood, which can detect common coinfections such as Lyme disease.⁵ Current clinical guidelines recommend a combination of oral atovaquone and azithromycin as the preferred treatment of babesiosis.⁵

Clinical manifestations of human babesiosis range from asymptomatic, mild-to-moderate disease, and severe disease.² Common symptoms typically include fever, chills, malaise, anorexia, abdominal pain, weight loss, and dark urine.⁶ Hematologic manifestations of babesiosis can range from mild anemia to pancytopenia, splenic rupture, disseminated intravascular coagulation, and hemophagocytic lymphohistiocytosis.⁷ Severe presentations of babesiosis are more common in patients in immunocompromised states such as asplenia, elderly (>60 years old), human immunodeficiency virus/acquired immunodeficiency syndrome, or on immunosuppressants.¹ Parasitemia less than 4% is associated with mild-to-moderate disease, whereas parasitemia more than 4% is associated with severe disease.² However, immunocompromised states can lead to severe disease regardless of parasitemia level.^{1,6}

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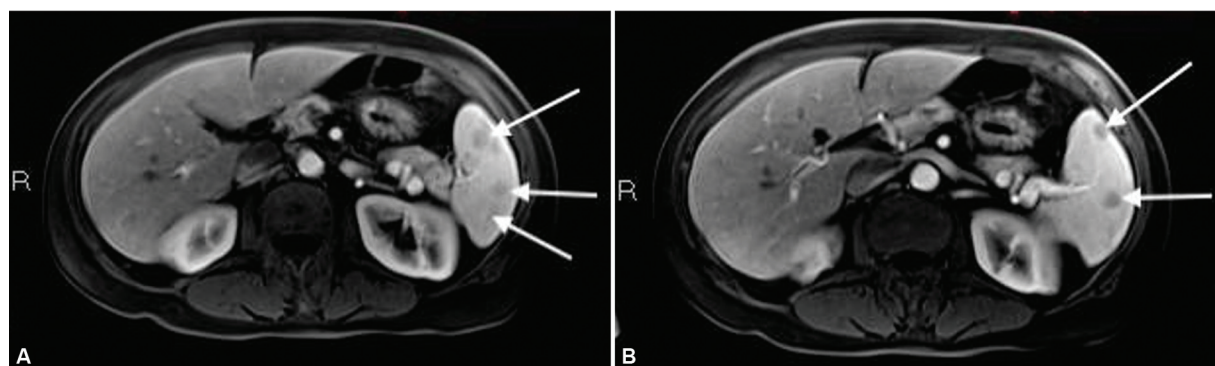


Fig. 1 (A, B) Axial T1-weighted contrast-enhanced images of the upper abdomen demonstrating multiple hypointense lesions in the spleen (arrows).



Fig. 2 Contrast-enhanced computed tomographic image of the upper abdomen demonstrating several hypoattenuating splenic lesions (arrows).

Reports of radiologic manifestations of babesiosis are limited in the current literature. There are several articles detailing babesiosis-associated acute pulmonary edema on high-resolution CT.^{8,9} Splenic rupture and infarction have been described in several case reports of babesiosis. In these cases, there was a wide range of splenic pathology seen on CT, including splenic lacerations, hematomas, and wedge-shaped infarcts.^{10–14} To our knowledge, there are no reports of splenic lesions as a radiologic finding of babesiosis on MRI. Interestingly, splenic lesions in our patient were not initially detected on CT, and only mild splenomegaly was detected. Splenic lesions in this patient were visualized as rounded, hypoattenuating lesions measuring up to 1 cm, best seen on post-contrast T1-weighted MRIs. Although these lesions may represent splenic infarction due to babesiosis infection, their round shape and locations within the spleen are atypical for splenic infarctions. Splenic infarctions are typically peripherally distributed, wedge-shaped lesions.^{12,13} Considering this, the splenic lesions found in our patient may be more likely due to babesiosis-induced inflammation of spleen rather than infarction.

Babesiosis-induced splenic lesions are theorized to occur due to large inflammatory reactions within the spleen, leading to damage of the vessels and formation of microthrombi within the splenic artery and its branches.^{1,12} Large inflammatory reactions leading to splenic lesions may be more common in patients

with higher parasitemia; however, one case report details a patient with mild parasitemia (0.5%) who presented with splenic infarctions.¹³ This same case report found a focally thickened spleen with no evidence of splenic vessel pathology on autopsy.¹³ This further underscores that currently, there is no well-understood mechanism for splenic lesions in babesiosis and it is most likely due to a combination of inflammation, structural vascular damage, and hematologic abnormalities.

Incidence of babesia infection is increasing, with a recent report by the Center for Disease Control showing a significant increase in cases within endemic states between 2011 and 2019.⁴ This increase may be due to factors such as rising urbanization of rural land and changes in climate patterns causing extremes in seasonal weather.¹⁵ Due to the rise of babesiosis across endemic regions, clinicians should maintain a high index of suspicion for patients who present with a constellation of nonspecific febrile symptoms in the summer months. Furthermore, with increased incidence of babesiosis from tick bite, there will likely be an increase in subsequent transfusion transmitted babesiosis, which can affect patients in nonendemic regions. Increased awareness and earlier detection of illness can help reduce severity of babesiosis, and its potentially fatal sequelae, by initiating prompt treatment. Splenic lesions due to babesia infection is a lesser known presentation of babesiosis, with only a few cases reporting splenic infarction or rupture as a clinical manifestation. Babesiosis should be considered in patients presenting with febrile symptoms and unexplained splenic lesions found on CT or MRI.

Conflict of Interest

None declared.

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