Disseminated Infection with *Bartonella henselae* as a Cause of Spontaneous Splenic Rupture

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A 65-year-old man developed massive hemoperitoneum secondary to spontaneous splenic rupture. Histopathological analysis of the spleen demonstrated necrotizing granulomas. Results of serological tests indicated infection with a species of *Bartonella*, and immunohistochemical staining established *Bartonella henselae* as the cause of splenitis. To our knowledge, this represents the first reported case of spontaneous splenic rupture caused by infection with a species of *Bartonella*.

Manifestations of infection caused by *Bartonella henselae* and *Bartonella quintana* that have been described elsewhere include cat-scratch disease (CSD), trench fever, relapsing bacteremia, endocarditis, neuroretinitis, bacillary angiomatosis, bacillary peliosis, peliosis hepatitis, and disseminated granulomatous lesions involving the liver and spleen [1–3]. Hepatosplenic disease is usually classified as either vascular proliferative disease (most commonly described in HIV-infected patients or other immunocompromised hosts) or necrotizing granulomatous disease (seen most often in immunocompetent hosts) [4]. In their review of hepatosplenic manifestations of *B. henselae* infection, Liston and Koehler [4] identified 42 patients with hepatic and splenic disease. A total of 26 patients in their series had documented splenic involvement, but no case of splenic rupture secondary to such involvement was described. In a recent report by Arisoy et al. [5] of pediatric patients with hepatosplenic CSD, splenic rupture was not listed as a feature of infection in any of the 19 reported cases. We describe a patient with disseminated *B. henselae* infection who developed splenic rupture and hemo-peritoneum as a consequence of this infection. To our knowledge, this represents the first reported case of spontaneous splenic rupture resulting from granulomatous disease associated with *Bartonella* infection.

**CASE REPORT**

A 65-year-old man developed acute-onset left upper-quadrant abdominal pain unassociated with trauma that was followed after a short interval by syncope. There was no history of fever. The patient was evaluated at his local hospital, where his blood pressure was determined to be 86/37 mm Hg. An abdominal CT scan revealed hemoperitoneum, which was considered most likely to be secondary to rupture of a splenic artery or of an abdominal aortic aneurysm. He was transferred to Wake Forest University Baptist Medical Center (WFUBMC; Winston-Salem, NC) for further treatment.

The patient was a retired sawmill worker and woodcutter who lived in a rural wooded area in northwest North Carolina. At least 5 cats, including several kittens, resided at his home, but he could not recall recent bites or scratches from these animals and denied exposure to fleas and lice. The patient had no exposure to persons with tuberculosis, and there were no identifiable risk factors for HIV infection. There was a long-standing history of heavy use of tobacco and alcohol.

At the time of admission to WFUBMC, the patient’s blood pressure was 98/45 mm Hg, his pulse was 124 beats/min, and his temperature was 36.9°C. There were...
IgG and IgM antibodies reactive with
A serum specimen obtained 1 week after surgery was tested for
growth; however, these cultures were incubated for only 4 days.

Before his surgery, no cutaneous papules or rashes. He had bilateral, firm, mobile
axillary lymphadenopathy, with the largest node measuring ~2
cm in greatest dimension. His abdomen was diffusely tender
to palpation and without recognizable hepatosplenomegaly.
Laboratory studies performed at admission revealed a WBC
count of 23,600 cells/mm³, a hemoglobin level of 7.7 g/dL, a
platelet count of 221,000 platelets/mm³, an aspartate aminotransferase level of 44 U/L, an alanine aminotransferase level of
20 U/L, an alkaline phosphatase level of 58 U/L, and a total
bilirubin level of 0.6 mg/dL.

After admission, an exploratory laparotomy revealed free
blood in the peritoneum and a 4-cm tear in the superior pole
of the spleen. At least 3 firm, well-circumscribed, white-tan
masses from 0.2 to 1.7 cm in greatest dimension were identified
on the surface of the spleen. The liver appeared to be grossly
normal without nodules or evidence of cirrhosis. A splenectomy
was performed. After the operation, the patient developed fever.
Cultures of blood and respiratory specimens were performed,
and empirical therapy with ampicillin/sulbactam and ciproflo-
Xacin was started. Histopathological evaluation of the resected
spleen revealed multiple necrotizing palisading granulomas with
microabscess formation (figure 1A). Smears of splenic tissue
stained with acid-fast, Gomori methenamine silver, and tissue
Gram stains failed to demonstrate mycobacteria, fungi, or bac-
teria. A lymph node resected from the splenic hilum also con-
tained necrotizing granulomas with microabscesses (figure 1B).

A serum sample obtained 12 days after the splenectomy was
submitted to the Centers for Disease Control and Prevention
(CDC; Atlanta, GA) and tested using an IFA assay to detect
antibodies reactive with Bartonella species [6]. This assay dem-
onstrated IgG antibody titers of 2048 and 1:1024 reactive with
B. henselae and B. quintana, respectively. Formalin-fixed, para-
fin-embedded spleen and lymph node specimens were also eval-
uated at the CDC using routine hematoxylin-eosin staining,
Steiner silver staining, and immunohistochemical (IHC) stain-
ing for B. henselae. In brief, 3-μm tissue sections were depar-
affinized and rehydrated in a graded alcohol series. After heat-
induced antigen retrieval using Antigen Retrieval Citra Solution
(BioGenex), tissue sections were incubated in a 1:100 dilution
of monoclonal mouse anti–B. henselae antibody (Biocare Med-
ical). This antibody reacts specifically with B. henselae in for-
malin-fixed, paraffin-embedded tissues but not with other Bartonella
species (including B. quintana) or with other irrelevant bacteria.
The sections were washed, incubated in biotinylated goat anti-
mouse and anti-rabbit antibody, and washed and incubated with
alkaline phosphatase–conjugated streptavidin. The slides were
rinsed, incubated in naphthol phosphate–fast red substrate, and
counterstained with Mayer hematoxylin stain. Clusters of small,
rod-shaped bacteria were visualized by means of Steiner silver
staining in necrotic foci within the granulomas (figure 1C).
IHC staining for B. henselae revealed bacteria in these same
areas in the lymph node and spleen specimens (figure 1D).

DISCUSSION
Various infectious agents, including EBV, cytomegalovirus, HIV,
rubella virus, Plasmodia and Salmonella species, Coxella burnetii,
and other bacteria, have been associated rarely with sponta-
naneous splenic rupture [7]. This case report indicates that B. henselae may also be associated with spontaneous rupture of
the spleen. Splenic involvement as a feature of systemic infec-
tion with B. henselae is well documented [1–5, 8]. A previously
published report described massive spontaneous hemoperito-
neum in association with hepatic bacillary peliosis in an HIV-
infected patient [9], but neither the recent articles by Liston
and Kohler [4] and Arisoy et al. [5] nor our review of the
literature revealed another case of spontaneous splenic rupture.
with hemoperitoneum in patients with visceral granulomatous disease associated with *Bartonella* infection.

The histopathological features of the resected spleen of this patient initially suggested CSD as the cause of splenic rupture, and immunohistochemical staining subsequently confirmed *B. henselae* as the causative agent of splenic disease, a diagnosis that was supported epidemiologically by the patient’s close and daily exposure to cats and kittens. A study by Koehler et al. [10], which examined the molecular epidemiology of *Bartonella* infections in persons with bacillary peliosis, demonstrated that *B. henselae*, rather than *B. quintana*, is the etiologic agent of splenic and hepatic disease in immunocompromised patients. A recent report from Israel also provides documentation that *B. henselae* may cause isolated splenic CSD in some immunocompetent patients [8].

Examination of a serum specimen obtained from our patient revealed high levels of antibodies reactive with *B. quintana* and *B. henselae*. In this context, serological testing alone was not sufficient to differentiate the etiologic agent. Arisoy et al. [5] noted that 9 (47%) of 19 children with hepatosplenic CSD had substantially higher titers of antibody reactive with *B. quintana* than with *B. henselae*. Of the remaining 10 patients, all had equivalent titers of antibodies reactive with both *Bartonella* species; none of the patients had antibody titers reactive with *B. henselae* that exceeded those reactive with *B. quintana*. Arisoy et al. [5] recognized that substantial serological cross-reactivity can occur between *B. henselae* and *B. quintana* antigens but also proposed that *B. quintana* may be equally as likely as *B. henselae* to cause systemic CSD. Further studies of patients with hepatosplenic disease associated with *Bartonella* infection may be warranted to better determine tissue tropisms of *Bartonella* species in immunocompetent patients.

This case expands the spectrum of recognized infectious agents that can be associated with spontaneous splenic rupture. In patients presenting with abdominal pain and nontraumatic hemoperitoneum, granulomatous hepatosplenic disease associated with *B. henselae* infection should be included in the differential diagnosis.

**Acknowledgment**

**Conflict of interest.** All authors: No conflict.
References


