

Splenic Abscess in Immunocompetent Patients Managed Primarily without Splenectomy: A Series of 7 Cases

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ABSTRACT

Introduction: Splenic abscesses are rare in immunocompetent adults. Despite advances in diagnosis and treatment, these abscesses are still potentially life threatening. Various factors have been reported to predispose otherwise immunocompetent adults to splenic abscesses. Splenectomy was once considered the “gold standard” treatment. However, the trend is shifting to a conservative approach.

Case Description: We describe seven cases of splenic abscess in immunocompetent adults, the cause of which ranged from tuberculosis to salmonella and was as rare as *Plasmodium vivax*. All the patients presented with fever (median duration = one month; range = one week to six years) and abdominal pain, and most also had weight loss. All patients were in their third to fifth decades of life. The patients were successfully treated with appropriate antibiotic therapy, after which they were clinically normal.

Discussion: A microbiological diagnosis of splenic abscess is of utmost importance. In this series, all patients underwent percutaneous aspiration. This was performed under radiologic guidance (either ultrasonography or computed tomography). Only one patient required diagnostic splenectomy. Irrespective of whatever surgical or nonsurgical drainage measures are employed, appropriate antibiotic therapy is the cornerstone of management. The dose and duration of antibiotic therapy depend on the causative organism and its sensitivity pattern.

INTRODUCTION

Splenic abscess is a rare entity, especially in developed countries.¹⁻⁶ On autopsy, the incidence of splenic abscess ranges between 0.14% and 0.7%.⁷ The causative microorganisms can be very diverse.⁸ Splenic abscess is uncommon among immunocompetent adults. Recognized risk factors in such patients include conditions such as infective endocarditis, diabetes mellitus, trauma, intravenous drug abuse, and hemoglobinopathies.^{9,10} Splenectomy was once considered the gold standard treatment. However, the trend is shifting to a conservative approach. Here, we report a series of 7 cases of splenic abscess in immunocompetent hosts. We emphasize the importance of obtaining an accurate microbiological diagnosis and discuss key management issues.

CASE PRESENTATIONS

Case 1

A 20-year-old man, a resident of Uttar Pradesh, India, was seen in the Medicine Outpatient Department because of complaints of left upper quadrant abdominal pain associated with low-grade fever and weight loss for the last month. The pain was a continuous, dull aching without any aggravating or relieving factor. He had a history of pulmonary tuberculosis 6 years earlier, which was treated with antituberculous therapy (ATT) for 6 months. He had been completely asymptomatic since then. There was no other remarkable medical history. On physical examination, he was febrile with a temperature of 37.8°C (100°F). On abdominal examination, the only abnormal finding was a palpable spleen tip. The remaining examination findings were normal.

His complete blood cell counts and liver function and kidney function test results were normal. The erythrocyte sedimentation rate was elevated to 80 mm in the first minute. An enzyme-linked immunosorbent assay (ELISA) was negative for human immunodeficiency virus (HIV). Markers for viral hepatitis were negative. A blood culture was negative for bacteria and fungus. Stool examination did not reveal any parasite. A Mantoux test using 10 IU of purified protein derivative showed a 15-mm induration at 48 hours. Chest radiography and echocardiography results were normal. Contrast-enhanced computed tomography (CT) scan of the abdomen showed mild splenomegaly with a single 2 cm × 2 cm, hypodense cystic lesion, likely to be a splenic abscess. He underwent a diagnostic CT-guided aspiration. The aspirate was positive for acid-fast bacilli, and cultures yielded *Mycobacterium tuberculosis*.

He was started on a regimen of ATT, after which his symptoms started to improve, and he became asymptomatic after a month of therapy. The patient was given Category 1 ATT (Revised National Tuberculosis Control Program) for 9 months, after which he was completely normal. Ultrasonography was repeated, and the result showed resolution of the abscess.

Case 2

A 30-year-old woman, who was a resident of Delhi, India, presented to our Medical Outpatient Department with high-grade continuous fever with chills and rigors and left upper quadrant abdominal pain of 2-week duration. There was no other unusual history. On physical examination, she was febrile with a temperature of 38.9°C (102°F). Abdominal examination

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found normal results. The rest of the examination findings were also unremarkable.

Her complete blood cell counts and liver and kidney function test results were normal. An ELISA test for HIV was negative. Stool examination had a normal result. Chest radiography and echocardiography also showed normal results. The Widal test and a blood culture were negative. Contrast-enhanced CT of the abdomen showed multiple hypodense, cystic lesions, with the largest measuring 2 cm × 1 cm, likely to be splenic abscesses. The largest of these was aspirated by a CT-guided procedure. Gram staining revealed gram-negative bacilli. Cultures yielded *Salmonella typhi*.

She was given intravenous antibiotics (ceftriaxone 1 g every 12 hours) and prescribed oral ofloxacin, 400 mg twice daily for 3 weeks. Subsequently, she received oral cefixime, 200 mg, and ofloxacin, 400 mg, both twice daily for 3 more weeks. She responded well to treatment, and symptoms completely resolved over 2 weeks. An ultrasonogram after 6 weeks showed resolution of the splenic abscess.

Case 3

A 32-year-old woman, a resident of Delhi, India, presented to the Medical Emergency Department with high-grade intermittent fever with chills and rigors and left upper quadrant abdominal pain of 1-week duration. There was no other unusual history. On physical examination, she was febrile with a temperature of 40°C (104°F). On abdominal examination, the only abnormal finding was splenomegaly. The rest of the examination findings were unremarkable.

Her complete blood cell counts and liver function and kidney function test results were normal. An ELISA test for HIV was negative. Chest radiography and echocardiography had normal findings. An antigen test for *Plasmodium vivax* malarial parasite was positive. Contrast-enhanced CT examination of the abdomen showed splenomegaly, with single hypodense cystic lesions measuring 2 cm × 3 cm, likely to be splenic abscesses. This was aspirated by a CT-guided procedure. The aspiration was negative for gram stain and acid-fast bacillus. A culture was sterile.

The patient was given intravenous artesunate and oral doxycycline, after which she improved completely. After treatment, a repeated ultrasonogram showed resolution of *P vivax* infection.

Case 4

A 44-year-old man from West Bengal, India, presented to our institute with intermittent fever of 3-month duration and abdominal pain of 2-week duration. He also had a documented weight loss of 6 kg during the previous 3 months. His medical history contained nothing abnormal. Physical examination findings revealed splenomegaly with ascites.

Abdominal ultrasonography showed multiple hypoechoic splenic lesions, with the largest measuring 2.3 cm × 1.7 cm. These findings were confirmed by CT scan (Figure 1). Three blood cultures were negative for bacteria and fungus. Echocardiography demonstrated normal results. Diagnostic aspiration from the splenic abscess was performed, and cultures yielded pansensitive *Escherichia coli*.

He received ceftriaxone therapy for eight weeks, followed by eight weeks of oral cotrimoxazole treatment. He was clinically better by two weeks from initiation of treatment and made a complete clinical recovery by the end of eight weeks of treatment. Abdominal ultrasonography one month after the start of intravenous antibiotic therapy showed incomplete resolution of the abscess. By the end of four months of therapy, there was complete resolution on the ultrasonogram. Four months after the end of antibiotic treatment, he has not had a recurrence of splenic abscess and remains in good health.

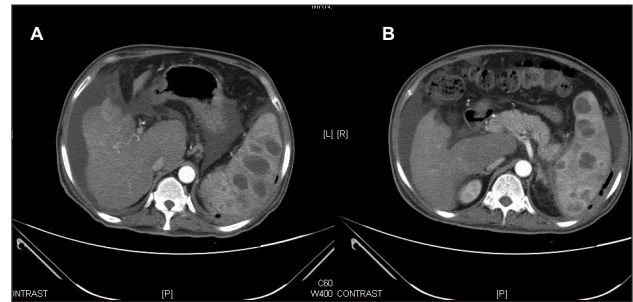


Figure 1. Abdominal computed tomography scans (A, B) showing multiple splenic abscesses. Note markedly irregular liver outline and ascites suggestive of chronic liver disease.

Case 5

A 36-year-old woman from Jharkhand, India, presented to us with a 3-week history of fever, abdominal pain, and unquantified weight loss. She had no unusual findings in her medical history. Examination revealed that she was febrile and had hepatosplenomegaly (palpable 3 cm and 5 cm below the costal margin).

Abdominal ultrasonography showed hypoechoic splenic lesions, predominantly located peripherally. These features suggested a splenic abscess. A CT scan performed for further characterization of these lesions showed multiple, predominantly peripheral irregular lesions, with the largest measuring 51 mm × 59 mm (Figure 2A). Three blood cultures were negative for bacteria and fungus. She was seronegative for HIV. Cultures from the splenic aspirate yielded quinolone-resistant *S typhi*.

She was treated with intravenous ceftriaxone for two weeks along with oral azithromycin for six months. She recovered clinically, with resolution of the abscess on the subsequent ultrasonogram (Figure 2B).

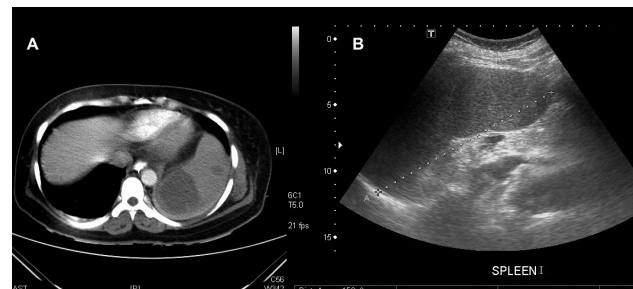


Figure 2. (A) Pretreatment computed tomography scan showing the largest splenic lesion and another lesion superior to it. (B) Ultrasonogram three months after initiation of treatment shows resolution of the lesion.

Case 6

A 36-year-old man from Andhra Pradesh, India, and an agriculturist by occupation came to our hospital with fever, abdominal pain, and weight loss (8 kg) of 3-month duration. He denied any prior illnesses, drug abuse, or extramarital sexual exposures. Clinical examination findings were unremarkable except for hepatosplenomegaly.

An ELISA for HIV was negative. Ultrasonography showed a single 8.9 cm × 6.0 cm splenic abscess with abdominal adenopathy. CT-guided diagnostic aspiration was performed (Figure 3). Cultures from the splenic aspirate did not yield a causative organism. A diagnostic splenectomy was done, cultures from which yielded *Burkholderia pseudomallei*. Post-operatively, a surgical site infection developed, and cultures also yielded the same organism. Sensitivity testing showed resistance to cotrimoxazole and aminoglycosides.

He was treated with 6 weeks of intravenous ceftazidime along with 12 weeks of oral cotrimoxazole and doxycycline. At end of 18 weeks of therapy, he was clinically well without any residual or recurrent collection on ultrasonography.

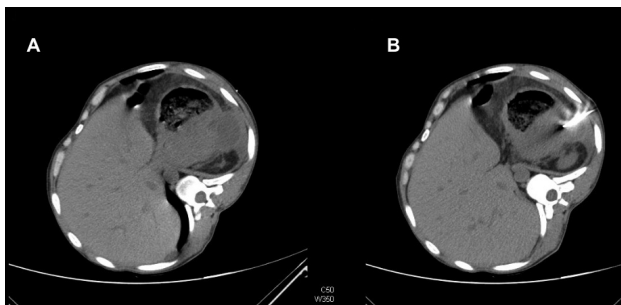


Figure 3. Lesion (A) undergoing computed tomography-guided aspiration (B).

Case 7

A 44-year-old diabetic man from Bangladesh presented to our Medicine Outpatient Department with a 6-year history of fever and abdominal pain and had lost about 18 kg of weight in the same period. He was a long-term smoker but denied alcoholism or other forms of drug abuse. His general physical examination findings were unremarkable except for hepatomegaly of 6 cm. On abdominal examination, the only abnormal finding was a palpable spleen tip.

Ultrasonography showed multiple splenic abscesses, the largest of which measured 1.2 cm × 1.1 cm. Three blood cultures taken on three successive days were negative for aerobic and anaerobic bacteria. Cultures from the splenic aspirate yielded *B pseudomallei*. On further evaluation, he was found to have hypocomplementemia (serum complement < 60% of normal).

He received ceftazidime therapy for four weeks, after which he was prescribed oral cotrimoxazole and doxycycline. He was lost to follow-up after completion of four weeks of intravenous antibiotic treatment, at which time he was clinically well.

All cases are summarized in Table 1.

DISCUSSION

Splenic abscess is an uncommon entity among immunocompetent adults. As noted previously, the autopsy incidence of splenic abscess ranges from 0.1% to 0.7%.⁷ Infective endocarditis, diabetes mellitus, trauma, intravenous drug abuse, and hemoglobinopathies are some of the reported predisposing factors in immunocompetent adults.^{9,10} Infective endocarditis seems to be the most common among these.

The spectrum of organisms that can cause splenic abscess is very large and has tended to change over time. An American study conducted nearly 3 decades ago found that anaerobes were more common as causative organisms than the aerobes;

Table 1. Summary of cases of splenic abscesses in immunocompetent adults

Case no.	Age/ Sex	Fever	Weight loss	Duration of symptoms	Abscess, single or multiple	Blood culture	Diagnostic test performed	Causative organism	Treatment	Clinical recovery	Radiologic resolution documented
1	20/M	Yes	Yes	1 month	Single	Negative	Aspiration	<i>Mycobacterium tuberculosis</i>	ATT	Yes	Yes
2	30/W	Yes	No	2 weeks	Multiple	Negative	Aspiration	<i>Salmonella typhi</i>	Aspiration + antibiotics	Yes	Yes
3	32/W	Yes	No	1 week	Single	Negative	Serology for <i>Plasmodium vivax</i>	<i>P vivax</i>	Antimalarials	Yes	Yes
4	44/M	Yes	Yes	3 months	Multiple	Negative	Aspiration	<i>Escherichia coli</i>	Aspiration + Antibiotics	Yes	Yes
5	36/W	Yes	Yes	3 weeks	Multiple	Negative	Aspiration	<i>S typhi</i>	Aspiration + Antibiotics	Yes	Yes
6	36/M	Yes	Yes	3 months	Single	Negative	Splenectomy	<i>Burkholderia pseudomallei</i>	Splenectomy + Antibiotics	Yes	Not applicable (splenectomy)
7	44/M	Yes	Yes	6 years	Multiple	Negative	Aspiration	<i>B pseudomallei</i>	Aspiration + Antibiotics	Yes	Lost to follow-up

ATT = antituberculous therapy; M = man; W = woman.

among the aerobes, *E coli* was the most common isolate.⁸ Other studies published in the past 17 years also noted that gram-negative organisms were the most common causative organisms.^{1,2} However, a more recent study from Pakistan found that gram-positive organisms were more than twice as common as gram-negative organisms.⁹ Polymicrobial flora is responsible for at least 10% to 15% of patients with splenic abscess.^{3,11-14} Negative culture from splenic abscess have been reported in up to 30% of cases,¹¹ which may reflect prior antibiotic use or fastidious organisms. Apart from these, cases of splenic abscess caused by *Mycobacteria*,¹⁵ *Brucella*,¹⁶ *Coxiella burnetti*,¹⁷ *Bartonella*,¹⁸ and other organisms (eg, *Candida*¹⁹ and *Actinomyces*²⁰) have also been reported. Similar to other studies, our series also highlights a multitude of causative organisms. Collectively, these data point to the extremely diverse microbiology of splenic abscesses and suggest that establishing a microbiological diagnosis is of paramount importance. The causes of splenic abscesses are listed in Sidebar: Causative Organisms for Splenic Abscesses.

The clinical presentation of our series of patients with splenic abscesses is not different from that of other studies. All our patients were in their third to fifth decades of life. All patients

had fever and abdominal pain, and most (five) also had weight loss. The median duration of symptoms was one month (range = one week to six years). Several other studies from Asia have reported similar findings.^{9,21,22}

For establishing the microbiological diagnosis, we used blood cultures and percutaneous diagnostic aspiration for all patients. None of our patients had a positive bacterial blood culture. This is in contrast to some reports suggesting that blood cultures may be positive in about half of the patients with splenic abscess.⁸ Diagnostic aspiration was performed under radiologic guidance (either ultrasonography or CT). None of our patients had any procedural complications, and the diagnostic yield was high. Only one patient (who had a negative culture of the diagnostic aspirate) needed a diagnostic splenectomy. With the availability of more advanced diagnostic modalities, diagnostic splenectomy is now rarely needed. Other useful methods of diagnosis include serologic analysis,²¹ which may be useful particularly for *Coxiella burnetti*.¹⁷ There are no data on the acid-fast bacillus positivity in patients with splenic abscess. In our series, serologic analysis for *P vivax* was useful in one patient.

From a therapeutic perspective, splenectomy was previously considered the gold standard.² Some of the recent reports also mention splenectomy as the common initial treatment.¹⁰ However, the need for splenectomy as a primary modality has been questioned by several recent studies showing that conservative management (ie, antibiotics with or without percutaneous drainage) is possible.^{9,21} In these studies, only about 18% to 22% of patients required therapeutic splenectomy. Approximately 80% of the patients were managed conservatively. Whether splenectomy should be done as a primary treatment modality or only in event of failure of antibiotic therapy remains unclear, and both of these approaches have been followed.^{2,9,21} In our series, no patient needed a therapeutic splenectomy.

Far less debatable is the role of antibiotics in these patients. Irrespective of whatever surgical or nonsurgical drainage measures are employed, appropriate antibiotic therapy is the cornerstone of management. The dose and duration of antibiotic therapy depend on the causative organism and its sensitivity pattern, thereby bringing us to stress again the need to establish a clear microbiological diagnosis. There is no guideline to suggest the duration of ATT in patients with tubercular splenic abscess. We propose that all patients with splenic abscess be evaluated for underlying predisposing conditions and multiple blood cultures be obtained. If the blood cultures identify the causative organism and the imaging (ultrasonography or CT) shows features of evolving abscess, an appropriate antibiotic regimen should be started. This subset of patients with evolving splenic abscess and one or more organisms identified by blood culture may not need splenic aspiration. For all other patients (ie, those without an identified organism and those with fully established splenic abscess), splenic aspiration (diagnostic and/or therapeutic) is necessary, followed by appropriate antibiotic treatment. The duration of antibiotics is often prolonged and depends on the causative organism or organisms, the clinical improvement, and resolution on radiologic images.

Causative Organisms for Splenic Abscesses

Aerobic gram-positive bacteria

Streptococci
Staphylococci
Enterococci

Aerobic gram-negative bacteria

Escherichia coli
Klebsiella pneumoniae
Pseudomonas aeruginosa
Proteus mirabilis
Serratia marcescens
Salmonella

Anaerobic bacteria and facultative anaerobes

Peptostreptococci and microaerophilic streptococci
Clostridium
Fusobacterium
Bacteroides
Prevotella
Propionibacterium acnes
Morganella morganii

Other bacterial causes

Burkholderia pseudomallei
Brucella
Coxiella burnetii
Bartonella
Actinomyces

Mycobacteria

Fungi

Candida

Parasites

Plasmodia

CONCLUSION

Splenic abscesses are rare in immunocompetent adults. Most of these so-called immunocompetent adults might have a predisposing factor. The spectrum of causative organisms is very diverse. Diagnostic aspiration is safe and has a high yield in establishing the diagnosis. Appropriate antibiotics with appropriate duration (along with percutaneous drainage as needed) are the mainstay of therapy. Splenectomy is rarely necessary for treatment. If splenic abscess is diagnosed and treated appropriately, the mortality of this potentially catastrophic condition can be reduced. ❖

Disclosure Statement

The author(s) have no conflicts of interest to disclose.

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Of No Use

On attentive Enquiry into the Office of that Organ [the spleen], it evidently appears to me, that it was not formed for the Benefit and Preservation of the Animal, of which it is a Part; and therefore it is of no use at all in respect of the Individual... . I myself have opened the Side of a Dog, and torn off with my Fingers the Spleen from the Parts to which it grew; yet without so much as tying up the Vessels, the Wound in the Side being sowed up, the Creature soon recovered, and shewed no sign of any Damage.

— Sir Richard Blackmore, 1654-1729, English poet, religious and political writer, and physician