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Isolated Splenic Tuberculosis Presenting as a Splenic Cyst: Diagnosis by Line Probe Assay Following a Negative GeneXpert Result

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Abstract

Isolated splenic tuberculosis is a rare manifestation of extrapulmonary tuberculosis, predominantly seen in immunocompromised individuals. Its clinical and radiological features are often nonspecific, frequently leading to delayed diagnosis. Only isolated case reports and small case series have been reported in the literature. We present the case of a 26-year-old immunocompetent male with no history of tuberculosis who presented with abdominal pain and intermittent low-grade fever. Imaging suggested a splenic cyst, initially misleading the diagnosis. Microbiological evaluation of the aspirated fluid by GeneXpert was negative, but line probe assay detected *Mycobacterium tuberculosis* with high-level isoniazid resistance. The patient was managed with percutaneous pigtail drainage and second-line antitubercular therapy. This case underscores the importance of considering tuberculosis in the differential diagnosis of solitary splenic cystic lesions in tuberculosis-endemic regions, even among immunocompetent hosts. Early molecular diagnostics and minimally invasive management can facilitate timely treatment and spleen preservation.

Categories: General Surgery, Infectious Disease
Keywords: isolated splenic tuberculosis, isoniazid resistance, line probe assay (lpa), splenectomy, ultrasonography guided

Introduction

Tuberculosis is a common infectious disease caused by *Mycobacterium tuberculosis*, primarily affecting the lungs. Extrapulmonary tuberculosis accounts for 15-20% of all tuberculosis cases [1]. Splenic tuberculosis usually occurs secondary to hematogenous dissemination from a primary pulmonary focus or as part of miliary spread. It is more commonly seen in immunocompromised individuals [2-5].

Isolated splenic tuberculosis without pulmonary involvement, particularly in an immunocompetent patient with no underlying comorbidities, is exceedingly rare [2-7]. It usually presents with nonspecific symptoms such as low-grade fever, left upper quadrant pain, and other constitutional symptoms. Clinically, it may present with splenomegaly and constitutional symptoms that can mimic hematological malignancies. Radiologically, it more often manifests as multiple splenic microabscesses rather than a solitary cyst [2-7].

The diagnosis of extrapulmonary tuberculosis is primarily established through microbiological evaluation of aspirated material from the involved lesion. GeneXpert MTB/RIF is commonly used as an initial molecular diagnostic test owing to its rapid turnaround time and ability to detect *M. tuberculosis* and rifampicin resistance. However, it does not identify resistance to antitubercular drugs other than rifampicin. In patients with negative GeneXpert results but persistent clinical suspicion, mycobacterial culture and further molecular drug-resistance testing are warranted. Line probe assay (LPA) can detect resistance to isoniazid and rifampicin by identifying mutations in resistance-associated gene regions, particularly *katG* and *inhA* for isoniazid resistance and *rpoB* for rifampicin resistance. Depending on the assay and specimen, LPA can be performed on appropriate clinical material or culture isolates. Management commonly includes antitubercular therapy based on drug susceptibility. Intervention may be required in symptomatic patients or those with large lesions or a risk of impending rupture.

Case Presentation

A 26-year-old male presented with a one-year history of dull, aching pain in the left upper quadrant of the abdomen and intermittent fever. The fever was typically low-grade, with an evening rise and night sweats, and was associated with weight loss. There was no past history of tuberculosis or significant personal or family history. There was no significant history of portal hypertension or tropical infections such as malaria or kala-azar.

On examination, the patient was afebrile and moderately built (BMI = 22.3 kg/m^2), with stable vital signs (pulse: 86/minute; blood pressure: 120/70 mmHg; oxygen saturation: 98% on room air). Abdominal examination revealed a palpable spleen 2 cm below the left costal margin, with no other features of portal

hypertension.

Routine laboratory investigations, including complete blood counts (hemoglobin: 11.2 mg/dL; total leukocyte count: 8,400/cumm; platelet count: 1,540,000/cumm) and peripheral smear, were normal, thus ruling out hematological malignancy. Serological tests for HIV and hepatitis B and C were within normal limits. Sputum GeneXpert for *M. tuberculosis* was negative, and chest radiography showed no evidence of pulmonary tuberculosis (Figure *1*).

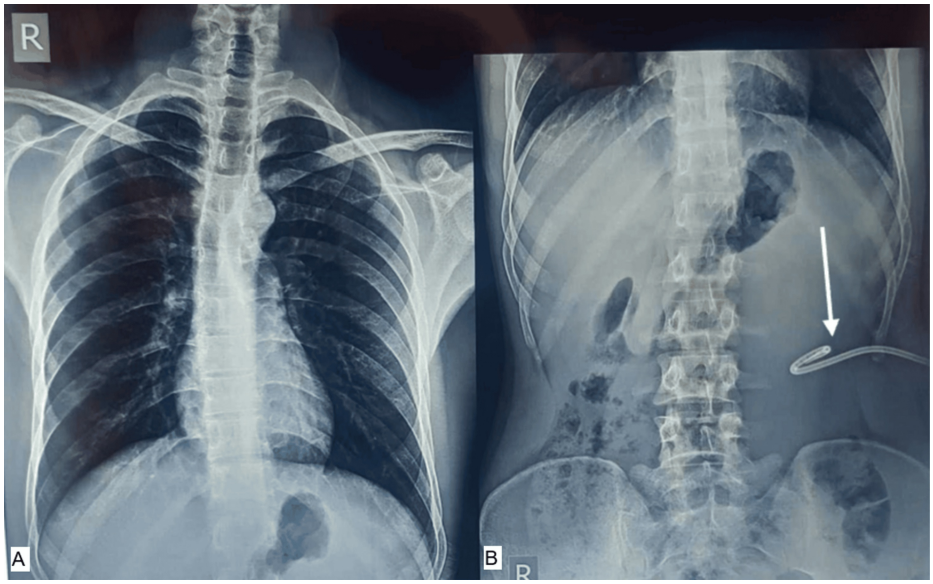


FIGURE 1: (A) Chest radiograph showing no evidence of previous pulmonary tuberculosis. (B) Abdominal radiograph obtained after pigtail catheter insertion showing the catheter in situ (marked with an arrow).

Ultrasonography and contrast-enhanced CT (CECT) of the abdomen revealed a well-defined, large (11.3 × 7.8 × 11 cm), homogeneously hypoechoic lesion arising from the lower pole of the spleen and extending to the splenic hilum. The lesion lacked internal septations, calcification, or capsular enhancement. There was no abdominal lymphadenopathy or ascites. A benign splenic cyst was considered the most likely diagnosis rather than a tuberculous abscess because of the absence of septations, an internal solid component, or perisplenic inflammation (Figure *2*).

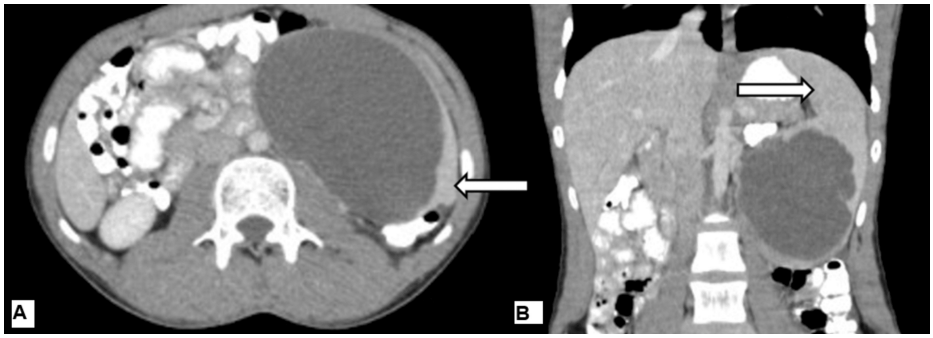


FIGURE 2: CECT of the abdomen demonstrating a large, solitary cystic lesion measuring approximately 11.3 × 7.8 × 11 cm, arising from the lower pole of the spleen, with a rim of normal splenic tissue (claw sign) (marked by an arrow).

CECT, contrast-enhanced CT

Ultrasonography-guided aspiration was performed, and the sample was sent for cytological and microbiological analysis. On gross examination, the aspirated fluid was purulent in consistency, with a

reddish hue, and was devoid of any foul smell. The absence of malodor, along with the clinical and radiological findings, made a conventional pyogenic bacterial abscess less likely, although bacterial infection could not be excluded on gross appearance alone. Cytology showed a paucicellular smear with blood-mixed proteinaceous material containing degenerated and viable neutrophils, lymphocytes, and macrophages, with no evidence of atypia. GeneXpert was negative for *M. tuberculosis*, and the acid-fast bacilli smear was negative. Mycobacterial culture was performed because of the negative GeneXpert result and was positive. A further LPA was performed to assess drug susceptibility. In our case, first-line LPA performed on the direct aspirate specimen detected *M. tuberculosis* with isoniazid resistance (a *katG* gene mutation) but rifampicin susceptibility. Second-line LPA showed no resistance to fluoroquinolones or second-line injectable drugs.

A diagnosis of isolated splenic tuberculosis was therefore established. The patient was started on antitubercular therapy for isoniazid-resistant (H-monoresistant) tuberculosis (levofloxacin, rifampicin, pyrazinamide, and ethambutol). He was discharged in stable condition with the catheter in situ and was followed up regularly.

The patient continued antitubercular therapy for an extended duration of one year because of the extrapulmonary focus. He experienced symptomatic improvement, marked by weight gain and increased appetite, after starting antitubercular therapy. Follow-up ultrasonography showed gradual resolution of the splenic collection. CECT repeated after three months showed complete resolution of the splenic cyst, and the pigtail catheter was subsequently removed (Figure *3*).

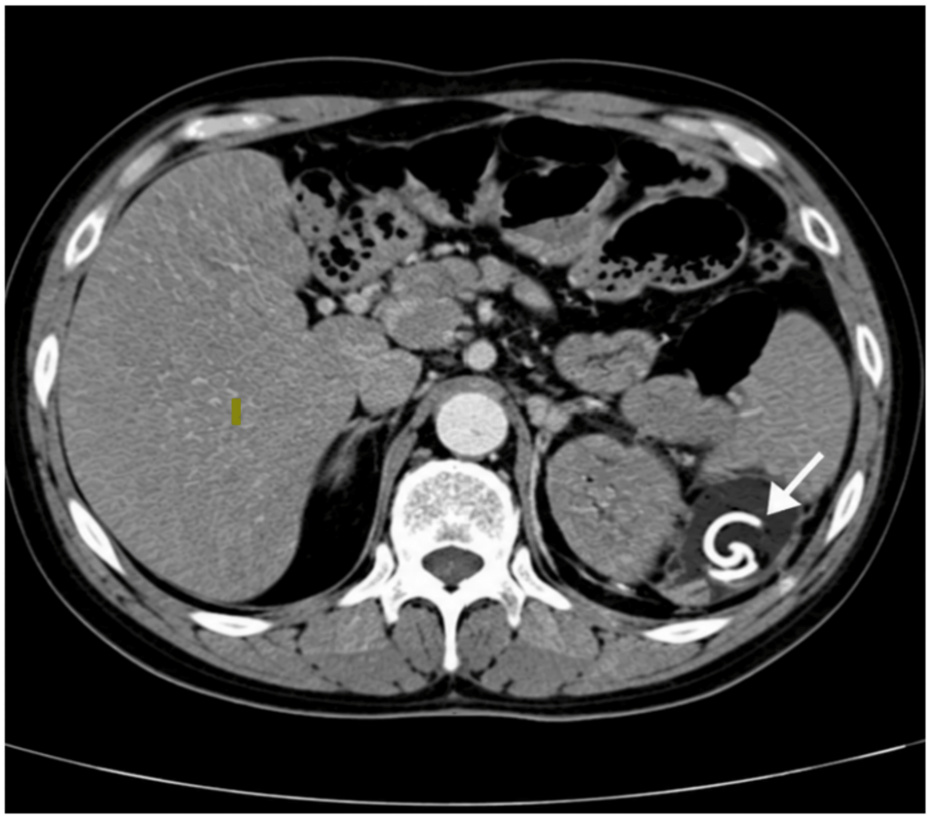


FIGURE 3: Follow-up CECT showing resolution of the cyst, with the pigtail catheter noted in situ.

CECT, contrast-enhanced CT

Discussion

Tuberculosis remains a major public health concern in developing countries and predominantly affects the pulmonary system [1]. Splenic tuberculosis most commonly results from hematogenous spread from a pulmonary focus or as part of miliary tuberculosis [2-4,6].

Isolated splenic tuberculosis is most frequently reported in patients with impaired immunity, particularly those with HIV infection, hematological malignancies, chronic immunosuppressive therapy, or organ transplantation [2-7]. Its occurrence in immunocompetent individuals is exceedingly rare [2-7], often

leading to diagnostic challenges due to nonspecific clinical and radiological findings. The absence of identifiable immunosuppressive risk factors in our patient further emphasizes the rarity of this presentation.

Patients typically present with pyrexia of unknown origin, left upper abdominal pain, weight loss, and anorexia [2-7]. Our patient presented with similar complaints but lacked a history of tuberculosis, known contact, or immunosuppression, which contributed to the low initial suspicion for tuberculosis.

Radiologically, splenic tuberculosis may present as multiple microabscesses [2-7]. Imaging generally demonstrates splenomegaly with hypoechoic lesions suggestive of splenic abscesses [2-7]. In our case, imaging revealed a solitary, large hypoechoic lesion without internal septations or perisplenic inflammation, thus mimicking a benign splenic cyst and delaying consideration of tuberculosis.

Historically, the diagnosis of splenic tuberculosis was often made after splenectomy on histopathological examination. Molecular tests such as GeneXpert MTB/RIF have enhanced the rapid diagnosis of extrapulmonary tuberculosis by enabling the detection of *M. tuberculosis* and rifampicin resistance [2-4,6,8]. In the present case, GeneXpert performed on the aspirated cyst fluid was negative, whereas the culture was positive and the LPA detected isoniazid resistance.

Isoniazid resistance has important therapeutic implications because isoniazid is one of the cornerstone first-line antitubercular drugs. Early identification of isoniazid resistance enables timely modification of treatment, thereby reducing the risk of treatment failure, relapse, and the development of additional drug resistance. In the present case, the detection of isoniazid resistance by LPA facilitated the early initiation of an individualized antitubercular regimen.

Management includes the initiation of antitubercular therapy. Surgical intervention may be required in cases involving large lesions, a risk of impending rupture, complications, or an inadequate response to medical therapy. Published reports describe splenectomy in several patients [3-7], while selected patients have been managed with antitubercular therapy without splenectomy [9] or with image-guided sampling followed by medical treatment [8]. In our patient, the lesion presented radiologically as a splenic cyst; aspiration was initially GeneXpert-negative, but mycobacterial culture and LPA subsequently identified isoniazid-resistant *M. tuberculosis*. The patient was managed with percutaneous pigtail catheter drainage and antitubercular therapy, thus preserving the spleen.

In tuberculosis-endemic countries, isolated splenic tuberculosis should remain an important differential diagnosis in patients presenting with splenomegaly, irrespective of immune status. Early image-guided sampling with comprehensive microbiological evaluation, including molecular assays for drug resistance, can facilitate timely diagnosis, guide appropriate therapy, and avoid unnecessary splenectomy.

Conclusions

Isolated splenic tuberculosis in immunocompetent individuals is an extremely rare and challenging diagnosis due to its nonspecific clinical and radiological presentation. It can mimic benign splenic cysts, leading to diagnostic delays. This case demonstrates that tuberculosis should remain a differential diagnosis in immunocompetent patients presenting with splenic cysts. Negative GeneXpert results do not exclude tuberculosis, particularly in paucibacillary cases; thus, mycobacterial culture and molecular assays such as LPA play a critical role in diagnosis and the detection of drug resistance. Early diagnosis can facilitate minimally invasive, spleen-preserving management and avoid unnecessary splenectomy.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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