

Tuberculous splenic abscess in the immunocompetent host: a report and review of literature

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Abstract

Tuberculous splenic abscess is rare, particularly in immunocompetent patients. Diagnostic difficulties usually arise in patients with tuberculous splenic abscess because of its non-specific presentation. We report an elderly male who presented with cough and fever and had pulmonary infiltrates suspicious of tuberculosis. Bronchoalveolar lavage microbiology including XpertMTB/Rif

assay was non-contributory. Contrast enhanced computed tomography scan of abdomen revealed multiple non-enhancing lesions in the spleen. Ultrasound guided splenic aspirate revealed pus that was positive for *Mycobacterium tuberculosis* in XpertMTB/Rif assay confirming the diagnosis of tuberculosis.

Introduction

Splenic tuberculosis with abscess formation is an uncommon manifestation and occurs primarily in immunocompromised patient. Due to its indistinct clinical features splenic tuberculosis has always remained a diagnostic challenge. We report a case of fever of unknown origin whose bronchoalveolar lavage failed to give a diagnosis even though his radiological features were suggestive of pulmonary tuberculosis. However, the diagnosis was established by XpertMTB/Rif test of the pus from splenic abscess which detected *Mycobacterium tuberculosis* (MTB). We also did a mini-review of the recent published literature on tuberculous involvement of spleen in immunocompetent host.

Case Report

An 81-year-old male carpenter presented with cough without any expectoration or haemoptysis for last two months. For the past 25 days he had intermittent fever and exertional breathlessness. There was no history of wheeze, chest pain, haematuria, epistaxis, vomiting, headache, joint pain or skin rash. His appetite had reduced and had lost 8 kg in the last two months. He was non-diabetic, seronegative for Human Immunodeficiency Virus (HIV) and denied any history of pulmonary tuberculosis in the past. Patient had taken multiple courses of antibiotics without any improvement in symptoms. On clinical examination, he was conscious, oriented but looked emaciated. Respiratory rate was 26/min with bilateral normal vesicular breath sounds. No abdominal organs were palpable on clinical examination. Initial laboratory investigations revealed microcytic hypochromic anaemia (haemoglobin - 10 g/dl), elevated white blood cell (14,560/cumm) count with neutrophilia and a raised erythrocyte sedimentation rate (ESR). Platelet counts, coagulation profile, renal and liver function tests were normal. Chest radiograph showed ill-defined opacities in right upper and middle lung zones (Figure 1). Computed tomography (CT) scan of thorax showed cavitary lesion in right upper lobe, minimal fibrosis and multiple tiny nodular opacities in bilateral lung fields some of

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them showing tree in bud appearance (Figure 2). Induced sputum analysis by XpertMTB/Rif assay was negative. No endobronchial lesions were found on bronchoscopy and bronchoalveolar lavage (BAL) was sent for microbiological and cytological tests. After a week during his follow up visit with BAL reports the patient's general condition had further deteriorated. BAL was negative for acid fast bacilli (AFB) stain and CBNAAT for MTB. Bacterial and fungal cultures of BAL showed no growth. He was admitted for further evaluation. Repeat blood counts, renal and liver function tests were within normal limits. Blood and urine cultures were sterile.

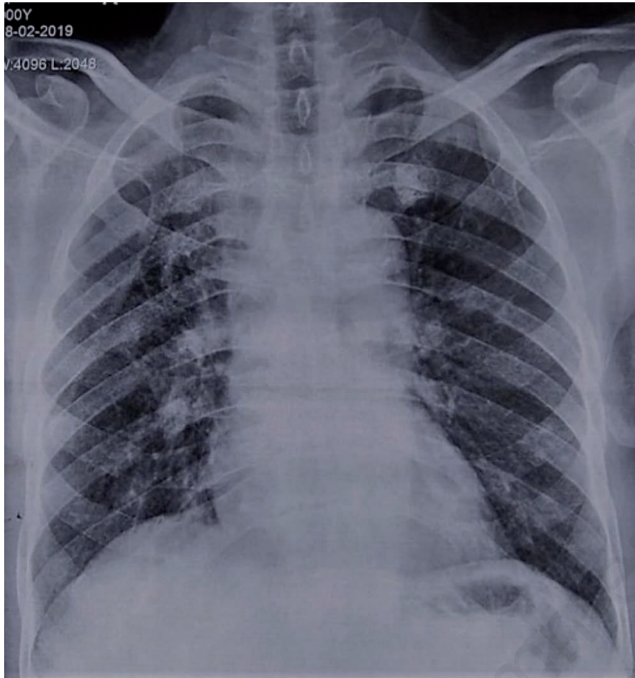


Figure 1. Chest radiograph shows ill-defined opacity in right upper and middle lung zones.

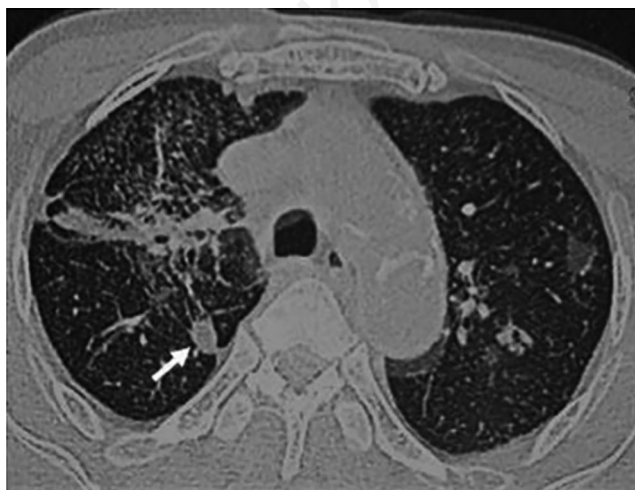


Figure 2. Axial CT scan of thorax (lung window) shows cavitating lesion in right upper lobe, nodule (arrow), minimal fibrosis and multiple tiny nodular opacities in bilateral lung fields.

Echocardiography was unremarkable. Subsequently, work up for auto-immune diseases and vasculitis panel was also negative. In view of persisting fever, contrast enhanced CT thorax and abdomen was done, that showed bilateral pleural effusion in addition to widespread nodules in bilateral lung fields (Figure 3). Multiple well defined non-enhancing hypodense lesions were present in splenic parenchyma suggestive of abscesses (Figure 4). Under ultrasonographic guidance around 2 ml of thick pus was aspirated from the splenic abscess. CBNAAT was positive (rifampicin sensitive) for MTB in the aspirated pus. Cultures ruled out the presence of any

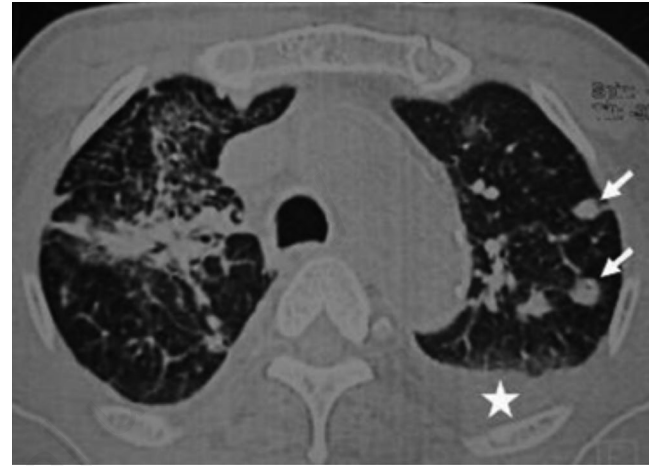


Figure 3. Axial CT scan of thorax done a month later at same level (lung window) shows pleural effusion (star) and increased nodular lesions (arrows) in both lung fields.



Figure 4. CECT of abdomen (coronal reformatted image) shows multiple non-enhancing hypodense lesions within splenic parenchyma (white arrows).

other bacterial or fungal organism in aspirated pus. Anti-tubercular therapy (ATT) with four drugs regimen was started and patient became afebrile on 15th day of initiation of ATT.

Discussion

The common modality of splenic abscesses formation is haematogenous dissemination to the spleen from an infective focus or usually associated with disseminated infection. The burden of extra-pulmonary tuberculosis (EPTB) is high, ranging from 15-20% in HIV-negative patients to 40-50% in patients with HIV pos-

itivity. EPTB distribution includes lymph nodes, pleural space, bones and joints, genitourinary, brain and abdomen in decreasing incidence. Abdominal TB which contributes to a mere 3% of all EPTB encompasses gastrointestinal tract, peritoneum, omentum, mesentery, regional lymph nodes and solid organs like liver, spleen and pancreas [1]. Tubercular involvement of liver, pancreas and spleen usually occurs in miliary or disseminated tuberculosis and commonly affect immunocompromised individuals. Isolated abdominal solid organ TB is rare in immunocompetent individuals. The incidence of splenic TB is 0.14-0.7% as per autopsy-based studies [2]. Clinical manifestations are non-specific like anorexia, fever, malaise, weight loss, night sweats, melena, pain abdomen and jaundice. Splenic TB can present as splenomegaly, hyper-

Table 1. Summary of evidence on splenic tuberculosis.

Sl	Year	Author	Journal	Title	Main findings	Comments
1	2019	Hashmi <i>et al.</i>	Journal of Ayub Medical College, Abbottabad	Splenic abscess as a complication of extra-pulmonary tuberculosis	85/F with fever, cough, pain abdomen had multiple bilateral small opacities on chest radiograph. Laparotomy revealed a ruptured splenic abscess.	Spleen sent for histopathology revealed granulomatous inflammation.
2	2018	Dhibar <i>et al.</i>	Oman Medical Journal	Isolated cold splenic abscesses in an immunocompetent individual	30/M with pain abdomen and non-tender splenomegaly had multiple hypoechoic areas with anechoic content in spleen.	Xpert MTB test and microbiology smears of aspirate from the spleen confirmed Mycobacterium tuberculosis.
3	2018	Sanke <i>et al.</i>	International Journal of Dermatology	Metastatic tubercular gummas and splenic tuberculoma secondary to tubercular lymphadenitis in an immunocompetent female	31/F presented with multiple painful nodular abscesses all over her body. USG showed hypoechoic lesion in splenic parenchyma without significant vascularity suggestive of tuberculoma.	Pus discharge from skin ulcer was sent for CB NAAT which was positive for mycobacterium tuberculosis.
4	2018	Dawani <i>et al.</i>	Tropical Doctor	Diagnosing isolated hepatosplenic tuberculosis in an immunocompetent patient: a case report	32/M with fever, weight loss and splenomegaly. CT showed multiple lesions throughout the liver, enlarged spleen and mesenteric nodes.	Biopsy of the hepatic lesions revealed caseous necrosis suggestive of tuberculosis. However AFB smear and PCR assay of aspirate from liver lesions were negative for Mycobacterium tuberculosis.
5	2018	Kumar <i>et al.</i>	Gastroenterology Report	Splenic tuberculosis in an immunocompetent patient can be managed conservatively: a case report	51/M with fever, pain left upper abdomen and tender splenomegaly. CECT of the abdomen revealed a hypodense lesion in the spleen with minimal left-sided pleural effusion.	A diagnosis of splenic tuberculosis was made by the findings of a CT-guided fine needle aspiration cytology.
6	2017	Khadka <i>et al.</i>	Case Reports in Gastrointestinal Medicine	Isolated splenic cold abscesses with peri-splenic extension: treated successfully without splenectomy	22/M with intermittent fever and left chest pain. CT showed peri-splenic hypodense collections and multiple splenic abscesses.	USG-guided aspirated pus was negative for AFB staining; however, PCR for MTB was positive.
7	2017	Divyashree <i>et al.</i>	The Permanente Journal	Splenic abscess in immunocompetent patients managed primarily without splenectomy: a series of 7 cases	Of 7 cases with splenic abscess only one was of tubercular aetiology who was a 20/M with pain upper abdomen, and fever. CT showed mild splenomegaly with a single abscess.	CT-guided aspiration was positive for acid-fast bacilli, and cultures yielded Mycobacterium tuberculosis.

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splenism, solitary splenic lesion or splenic abscess. Multiple abscesses in splenic parenchyma is usually seen in patients with HIV infection but is a rare entity in patients with preserved immunity [3-5]. A non-systematic review of the evidence published between 2000 and 2019 was done, searching from the MEDLINE database, using the key words, 'splenic tuberculosis' and 'immunocompetent'. Search results were filtered to include only the articles in English language and those involving adult patients. With this methodology, we found 31 articles with tuberculous involvement of spleen, of which 23 had attempted some kind of invasive intervention on spleen such as fine needle aspiration, biopsy and splenectomy (Tables 1-3). Of the 23 articles only five had detected MTB by CBNAAT in the splenic sample (Table 2).

Besides, there were nine published articles where the diagnosis of tuberculosis was established by samples from sites other than spleen (Table 3). Study done by Dixit *et al.* over a period of 3 years in an Indian hospital found only 16 patients (0.01%) with splenic involvement from a total of 9205 TB patients and were able to identify a cause for immunodeficiency in only 9 of those 16 patients (8 with HIV infection and 1 with myelodysplastic syndrome). Ten of those 16 patients in their study had pulmonary involvement too [6]. In a retrospective study done by Chien *et al.*, 590 cases with active TB were identified over a period of 13 years who received care at the Saint Michael's Hospital TB Clinic in Canada, 24 had abdominal TB. Surprisingly none of them had splenic involvement [7]. Haematogenous infection, contiguous

Table 1. Continued from previous page.

Sl	Year	Author	Journal	Title	Main findings	Comments
8	2017	Wangai <i>et al.</i>	BMC Research Notes	Isolated splenic tuberculosis with subsequent paradoxical deterioration: a case report	26/M with PUO. CT scan showed enlarged spleen with multiple hypodense nodules suggestive of multiple splenic microabscesses.	Histopathological study of the splenic biopsy specimen revealed extensive multiple granulomas mainly necrotising. ZN stain of the biopsy processed specimen revealed acid-fast bacilli, confirmed by GeneXpert MTB/RIF which yielded MTB sensitive to rifampicin.
9	2017	Rao <i>et al.</i>	BJR Case Reports	Isolated splenic tuberculosis detected only on FDG-PET	17/F with PUO had normal chest radiograph CT abdomen was normal. MRI abdomen, did not show any nodules in the spleen.	18 FDG-PET-CT scan demonstrated multiple focal areas of high FDG uptake within the spleen which on biopsy revealed necrotizing granulomatous lesions suggestive of TB.
10	2016	Nasa <i>et al.</i>	Indian Journal of Tuberculosis	Isolated splenic tuberculosis diagnosed by endoscopic ultrasound-guided fine needle aspiration	48/F presented with persistent low-grade fever and weight loss. CT abdomen revealed multiple hypodense lesions in spleen.	Endoscopic ultrasound-guided fine needle aspiration of splenic lesion revealed granulomatous inflammation.
11	2016	Diallo <i>et al.</i>	BMC Research Notes	Hepatosplenic tuberculosis simulating secondary malignant lesions with cholangitis	48/F with febrile jaundice had multiple in liver and spleen, pulmonary calcifications, mediastinal and abdominal lymph nodes on CT scan.	Liver biopsy showed epithelioid and giant cell granulomas without caseous necrosis. A multifocal tuberculosis was diagnosed and patient was started with anti-tubercular therapy.
12	2016	Lin <i>et al.</i>	World Journal of Surgical Oncology	Solitary splenic tuberculosis: a case report and review of the literature	64/F with abdominal discomfort and nausea. The spleen had a large hypoechoic lesion.	Splenectomy specimen showed granulomatous inflammation with large inflammatory necrosis and caseation necrosis.
13	2015	Amraoui <i>et al.</i>	International Journal of Mycobacteriology	Cutaneous tuberculosis revealing multifocal tuberculosis in immunocompetent patients	Out of 7 cases with multifocal tuberculosis only 1 had splenic involvement. Skin biopsy showed giant epithelioid cell granuloma with caseation.	Article does not mention separately how the splenic involvement was diagnosed and confirmed.
14	2015	Lee <i>et al.</i>	The Korean Journal of Gastroenterology	Splenic tuberculosis forming a gastro-splenic fistula	61/M with cough and abdominal discomfort had consolidations with multi-focal hypodense lesions in the spleen.	A fistula tract between the stomach and spleen was seen on endoscopy. ZN stain for AFB and PCR for tuberculosis were negative. Biopsy showed a well-defined granuloma with caseous necrosis.
15	2014	Chakradhar <i>et al.</i>	BMJ Case Reports	A rare presentation of splenic tuberculosis with a pseudocyst	24/F with pain in upper abdomen, fever and a palpable abdominal mass.	Total splenectomy was carried out. Histopathology was consistent with splenic TB.

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infection, haemoglobinopathies, HIV infection, chemotherapy, and trauma are the various mechanisms of splenic abscess formation. The red pulp of the spleen is relatively devoid of phagocytic activity and helps the entrapped, slow-growing mycobacteria to escape from the reticuloendothelial system of spleen explaining for the tubercular aetiology of splenic abscess. On CT, tubercular splenic abscess is characterised by solitary or multiple hypodense nodular areas which are usually small (<2 cm), ill-defined with mild contrast-enhancement [8]. Radiologically, splenic tuberculosis is classified as micronodular or macronodular, depending on whether it is smaller or larger than 10 mm, respectively [9]. The former is more common and usually seen in disseminated TB whereas the later one is rare and could manifest as a single abscess or multiple large nodules or multiple abscesses. Our patient had pulmonary involvement as well but the bronchoalveolar lavage failed to demonstrate *Mycobacterium tuberculosis* in XpertMTB/Rif assay.

Studies have shown that in sputum smear negative patients with clinico-radiological features of pulmonary tuberculosis, XpertMTB/Rif has good sensitivity for diagnosis in BAL and it may even obviate the need for transbronchial lung biopsy [10,11]. Our patient never experienced any abdominal symptoms in his entire course of illness even though he had multiple splenic abscesses. However, the aspirate from splenic abscess clinched the diagnosis of tuberculosis by CBNAAT.

Therefore, evaluation for extrapulmonary involvement of tuberculosis is crucial in establishing the diagnosis in patients with strong suspicion of pulmonary tuberculosis but non-contributory mycobacterial tests from pulmonary samples. In such cases, even a small amount of diagnostic sample, if can be obtained from the involved organ, may be very useful to clinch the diagnosis. Last but not the least, splenic abscess even in immunocompetent individuals, should raise the suspicion of tubercular aetiology.

Table 1. Continued from previous page.

Sl	Year	Author	Journal	Title	Main findings	Comments
16	2014	Jain <i>et al.</i>	Oxford Medical Case Reports	Disseminated tuberculosis causing isolated splenic vein thrombosis and multiple splenic abscesses	16/F with fever, dry cough, jaundice, chronic diarrhoea, amenorrhoea and weight loss. CT chest revealed mediastinal lymph nodes and consolidation. CT abdomen revealed multiple hypodense lesions in the spleen and splenic vein thrombosis.	Bone marrow culture was positive for MTB. Pleural fluid PCR study was also positive for <i>M. tuberculosis</i> .
17	2014	Mandal <i>et al.</i>	BMJ Case Reports	Isolated splenic tuberculosis in an immunocompetent patient	20/F with fever, weakness and weight loss had splenomegaly and hypochoic areas in splenic parenchyma.	Few AFBs were detected in the CT guided aspirate.
18	2013	Mishra <i>et al.</i>	Indian Journal of Surgery	Isolated tuberculosis of the spleen: A case report and review of literature	28/M with left abdominal discomfort. Enlarged spleen with cystic lesion containing pus.	Splenectomy was performed. The cut section of the lesion showed caseating necrosis of the spleen.
19	2013	Yeo <i>et al.</i>	Tuberculosis and Respiratory Diseases	Spontaneous splenic rupture as a paradoxical reaction during treatment for splenic tuberculosis	33/F with high fever and abdominal pain had multiple low-density lesions in the spleen and enlarged mesenteric lymph nodes.	USG guided splenic biopsy revealed inflammatory cells with focal necrosis, AFB staining and TB-PCR were negative. Based on clinical and radiological findings anti-tubercular drugs were started.
20	2013	Basa <i>et al.</i>	International Journal of Surgery Case Reports	A case of isolated splenic tuberculosis	27/M with presented with epistaxis. PET scan showed splenomegaly with hypermetabolic FDG activity.	Splenectomy was performed in view of dropping platelet count. The entire spleen was replaced by caseating granulomas and necrotizing-type granulomatous inflammation. <i>Mycobacterium tuberculosis</i> were seen by AFB stain.
21	2012	Lonkar <i>et al.</i>	Annals of Medical and Health Sciences Research	Splenic tuberculosis presenting as ascites in immunocompetent patient	60/M with pain abdomen, vomiting and distended abdomen. CT guided fine needle aspiration from splenic lesions showed granulomas with area of caseation favouring diagnosis of tuberculosis	Culture and polymerase chain reaction-based confirmation could not be contemplated due to inadequacy of sample.
22	2012	Park <i>et al.</i>	Soonchunhyang Medical Science	Primary hepatosplenic tuberculosis in an immunocompetent adult and domestic literature review	25/M with intermittent fever and night sweats. CT scan showed hepatosplenomegaly and multiple microabscesses in the spleen.	TB-PCR, ZN stain, liquid and solid culture for MTB in the liver biopsy specimen were negative. Histopathology of the liver specimens revealed caseous necrosis based on which tuberculosis was diagnosed.

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Table 1. Continued from previous page.

Sl	Year	Author	Journal	Title	Main findings	Comments
23	2012	Kim <i>et al.</i>	Journal of Clinical Medicine Research	Primary tuberculous abscess of the spleen in an immunocompetent patient diagnosed by biochemical markers and radiologic findings	55/F with abdominal distension, fever and weight loss. CT scan revealed splenomegaly with multiple well-defined lesions and ascites.	ADA of ascitic fluid was 76.9 IU/L. Interferon-gamma release assay was positive and thus patient was started on anti-tubercular treatment.
24	2012	Ray <i>et al.</i>	Indian Journal of Medical Microbiology	Isolated tubercular splenic abscess: Can we defer splenectomy? Our single experience with anti-tuberculous therapy alone	35/F with fever, malaise, weight loss and night sweats. CT of the abdomen showed multiple well-defined hypodense lesions in spleen.	Splenic lesion biopsy showed granulomas with areas of caseation. Few acid-fast bacilli on ZN staining. Culture and PCR based confirmation could not be done due to less sample.
25	2011	Rojo <i>et al.</i>	Diagnostic Microbiology and Infectious Disease	Multidrug-resistant tuberculosis presenting as a solitary splenic mass in an immunocompetent patient	60/F with anemia, asthenia and arthralgia. CT revealed a 10-cm spleen mass. PET revealed an abnormal, hypermetabolic activity within an enlarged spleen. Splenectomy was carried out for a definitive diagnosis.	Histopathology showed multiple granulomas with large caseation areas. No acid-fast bacilli were found. <i>Mycobacterium tuberculosis</i> DNA was detected in TB PCR analysis of sample. Genotype MTBDR plus kit detected rifampicin and isoniazid (high and low level) genes.
26	2010	Pottakkat <i>et al.</i>	Gut and Liver	Tuberculosis of the spleen as a cause of fever of unknown origin and splenomegaly	339 splenectomies performed between January 1989 and December 2008 for indications other than trauma.	Histopathologic analysis of the spleen revealed tuberculosis in 8 patients. All 8 patients were referred for splenectomy due to fever of unknown origin.
27	2010	Udgaonkar <i>et al.</i>	Indian Journal of Medical Microbiology	Asymptomatic, isolated tubercular splenic abscess, in an immunocompetent person	38/F with complaints of vaginal vault prolapse. Preoperative USG abdomen revealed hypoechoic areas in spleen.	USG guided FNAC of splenic lesion yielded pus. ZN stain of the pus showed presence of a few acid fast bacilli. <i>Mycobacterium tuberculosis</i> grew on Lowenstein Jensen medium after six weeks of incubation.
28	2009	Raul	Indian Journal of Surgery	Tubercular splenic abscess in immunocompetent patients: a rare entity	Case 1: 50/F with fever and pain abdomen had splenomegaly with large cystic necrotic areas within the spleen. Case 2: 22/M with dull aching pain abdomen, splenomegaly along with multiple abscesses with areas of infarcts.	Case 1: Splenectomy was performed. Biopsy reported as tubercular abscess of spleen. The pus sent for AFB stain was positive. Case 2: Splenectomy was performed. Biopsy was reported as tuberculosis of spleen.
29	2009	Fooladi <i>et al.</i>	International Journal of Infectious Diseases	Splenic tuberculosis: a case report	47/M with pain left hypochondrium and tender splenomegaly. CT scan showed diffuse lesions and multiple micronodules in the spleen. Splenectomy was carried out.	Large areas of caseation, multiple granulomas and Langham's giant cells were seen. Acid-fast staining showed the existence of numerous AFB. TB PCR was positive for MTB. The same was grown after 40 days in LJ medium.
30	2008	Gupta <i>et al.</i>	Lung India	Tuberculosis of spleen presenting with pyrexia of Unknown origin in a non-immunocompromised woman	49/F with fever of unknown origin. Had tender splenomegaly. CT revealed an enlarged spleen with multiple small focal hypodense lesions suggestive of abscesses.	CT-guided biopsy from the splenic lesions revealed epithelioid cells granuloma with central necrosis along with Langham's giant cells. Culture of the specimen on LJ medium isolated MTB.
31	2004	Sharma <i>et al.</i>	Indian Journal of Chest Diseases and Allied Sciences	Tuberculous abscess of the abdominal wall and multiple splenic abscesses in an immunocompetent patient	38/M presented with a well-defined abscess in the abdominal wall. Spleen was found to be enlarged, with multiple small focal hypodense lesions, suggestive of abscesses	CT guided FNA from the splenic lesions showed epithelioid cell granulomas in a necrotic background. However, ZN stain revealed AFB in the aspirate from abdominal wall abscess which was later on confirmed by mycobacterial culture.

Table 2. Summary of the diagnostic modalities in splenic tuberculosis.

Article no. from Table 1	AFB/ZN smear	CB-NAAT/PCR	MTB culture	Histopathology
1	-	-	-	+
2	+	+	-	-
5	-	-	-	Cytology
6	Negative	+	-	-
7	+	-	+	-
8	+	+	-	+
9	-	-	-	+
10	-	-	-	+
12	-	-	-	+
15	-	-	-	+
17	+	-	-	-
18	-	-	-	+
19*	Negative	Negative	-	Inconclusive
20	+	-	-	+
21	Inadequate sample	Inadequate sample	-	+
24	+	Inadequate sample	Inadequate sample	+
25	Negative	+	-	+
26	-	-	-	+
27	+	-	+	-
28. 1 st Case	+	-	-	-
28. 2 nd Case	-	-	-	+
29	+	+	+	+
30	-	-	+	+
31	-	-	-	+

*Treatment started on clinical and radiological basis.

Table 3. Summary of articles where splenic intervention was not done.

Article no. from Table 1	Site	AFB/ZN smear	CB-NAAT/PCR	MTB culture	HPE
3	Skin	-	+	-	-
4	Liver	Neg	Neg	-	+
11	Liver	-	-	-	+
13	Skin	-	-	-	+
14	Fistulous tract	Neg	Neg	-	+
16	Pleural fluid	-	+	-	-
	Bone marrow	-	-	+	-
22	Liver	Neg	Neg	Neg	+
23*	Ascitic fluid	-	-	-	-
31	Abdominal wall abscess	+	-	+	-

*ATT was started on basis of ascitic fluid ADA and positive IGRA.

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