REVIEW ARTICLE

Splenic Abscess Complicating *Salmonella paratyphi* A Infection: A Case Report and Systematic Review of Literature (2001–2024)

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Received: 28 August 2024; *Accepted:* 06 November 2024

Abstract

Introduction: Recently, there is an upsurge of splenic abscess due to typhoidal *Salmonella* in India.

Methods: We present a case of splenic abscess caused by *Salmonella paratyphi* A in an immunocompetent male and conducted a systematic review of splenic abscess cases attributed to typhoidal *Salmonella* described between January 2001 and May 2024.

Results: Of 33 cases reviewed, 26, 2, and 1 case each were reported from India, Sri Lanka, Turkey, Qatar, and Pakistan, respectively. *S. typhi* and *S. paratyphi* A were reported from 29 and 4 cases, respectively. Mean age was 21 years, with 13 children and 8 females. About 28 were immunocompetent and two had diabetes mellitus. Blood, pus, stool, and pleural fluid grew the isolate in 13, 20, 1, and 1 case, respectively. Ultrasonography (USG) abdomen was diagnostic in 28 cases and normal in two cases. Computed tomography (CT) abdomen was diagnostic in all the 27 cases tested. About 17, 12, and 1 patient showed multiple abscesses, solitary lesion, and multiloculated lesion, respectively. USG/CT-guided percutaneous drainage and splenectomy were performed in 25 and 7 cases, respectively. All 33 patients recovered from the infection.

Conclusion: We aspire to raise acquaintance among health professionals regarding this uncommon entity and foresee it in pertinent contexts.

Journal of The Association of Physicians of India (2025): 10.59556/japi.73.0998

Introduction

A spectrum of infectious agents could be ascribed for splenic abscesses, inclusive of bacterial, fungal, mycobacterial, and parasitic. Common bacterial agents include *Klebsiella pneumoniae*, *Escherichia coli*, and *Staphylococcus aureus*. Unusual organisms include *Burkholderia pseudomallei*, *Salmonella* species, *Mycobacterium*, and actinomycetes. In untreated typhoid fever, splenic abscess develops as one of the complications in the 3rd or 4th week of infection.

Methods

We describe a patient with splenic abscess caused by *Salmonella paratyphi* A in an immunocompetent male and conducted a systematic review of splenic abscess cases caused by typhoidal *Salmonella* described between January 2001 and May 2024. Medical record was analyzed to evaluate demography, clinical characteristics, management, and outcome.

Literature Search

We formally analyzed reported cases of splenic abscess owing to typhoidal *Salmonella*. We scrutinized the literature, including PubMed and every single reference for publications of original articles, single cases, or case series including the ensuing keywords: "splenic abscess," and "typhoidal *Salmonella*." Besides, the bibliography of each publication was explored to verify if all reported cases were collected for this review. It was ensured to exclude cases prone to cause duplication.

Case Report

A 24-year-old male presented with fever for 10 days and loose stools (two episodes for 1 day). The fever was insidious in onset, associated with chills and rigor. He was initially treated for typhoid fever elsewhere, became symptomatically better for a few days, and then again developed symptoms. There was a history of abdominal pain and intake of food outside the home. He also had a history of tobacco use (chewable) for 10 years and an allergy to penicillin. On examination, he was afebrile, nontoxic, and his abdomen was soft without tenderness. Investigations showed hemoglobin of 10 gm/dL, total white blood cells (WBC) of 4600 cells/mm^3, total bilirubin of 4.28 mg/dL, direct bilirubin of 1.84 mg/dL, indirect bilirubin of 2.44 mg/dL, aspartate aminotransferase (AST) of 114 U/L, alanine aminotransferase (ALT) of 124 U/L, and alkaline phosphatase (ALP) of 203 U/L. Widal test results were suggestive of paratyphoid fever with O 1:160, H <1:20, AH 1:320, and BH <1:20 dilution. Peripheral smear showed microcytic hypochromic anemia with a left shift of WBCs. Blood culture was sterile, and the human immunodeficiency virus (HIV) test was negative. Ultrasonography (USG) abdomen showed multiple peripheral nonenhancing hypodense areas in the spleen, the largest measuring 9 × 6.5 cm. Empirical treatment was initiated with ceftriaxone. The patient remained febrile (102°F) and developed an episode of loose stools. The antibiotic was escalated to meropenem 1 gm 8th hourly. Computed tomography (CT) abdomen contrast was not taken due to financial constraints. With ultrasound guidance, 50 mL of hemorrhagic pus was aspirated from the largest splenic collection; the rest of the collections were not fully liquefied, hence not aspirated. Pus aspirate from the splenic abscess grew *S. paratyphi* A, sensitive to cotrimoxazole, ampicillin, chloramphenicol, ceftriaxone, meropenem, and resistant to fluoroquinolones. After 11 days of meropenem, he was discharged with an uneventful recovery.

Literature Review

Database search yielded a total of 35 cases. After screening, we excluded one duplicate and one case report with inadequate details. Overall, 33 cases with full text were assessed for eligibility and included for review, with seven cases recently in 2023 (21%).[1–29] Table 1 illustrates the presentation, laboratory and

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How to cite this article: Ganesan V, Rajendran T, Ponnusamy SS. Splenic Abscess Complicating *Salmonella paratyphi* A Infection: A Case Report and Systematic Review of Literature (2001–2024). J Assoc Physicians India 2025;73(9):66–72.

Table 1: Clinical presentation, treatment, and outcome of splenic abscess cases due to typhoidal *Salmonella*

Authors/year/country	*Age/sex*	*Presentation*	*Radiology*	*Total WBC (cells/mm^3)*	*Pus aspirate culture*	*Blood culture*	*Widal*	*Typhi-dot*	*Lung*	*Drainage*	*Splenectomy*	*Antibiotics*	*Outcome*
Chaudhry et al., 2003/India[1]	–/M	–	–	–	*S. typhi*		–	–	–	–	–	–	Cured
Sathiyasekaran and Shivbalan, 2005/India[2]	15/F	Fever for 3 weeks, pain in left shoulder for 1 week	Multiple splenic abscess	Normal	*S. typhi*	Sterile	160 (O and H)	–	Lt pleural effusion	30 mL pus drained	–	Ceftriaxone for 2 weeks	Cured
Yuksel et al., 2005/Turkey[3]	12/M	Fever and abdomen pain for 2 weeks	Multiple splenic abscess	5,600	Not done	*S. typhi*	Positive	–		–	Yes	Ceftriaxone for 10 days	Cured
Piplani et al., 2011/India[4]	21/M	Fever with chills and rigors and productive cough of 10 days	Multiple splenic abscess	6,900	*S. typhi*	Sterile	Negative		–	400 mL pus drained	Emergency splenectomy	Ceftriaxone 4 weeks	Cured
	19/M	Fever for 1 day	USG normal, CT-multiple splenic abscesses	8,800	Not done	*S. paratyphi* A	Positive 1:80			Percutaneous drainage		Ciprofloxacin for 1 week followed by ceftriaxone	Cured
Thapa et al., 2007/India[5]	10/M	Fever and abdominal pain for 15 days	Multiple splenic abscesses	4,800	Not aspirated	*S. typhi*	Positive O 1:320				Yes	Ceftriaxone and ofloxacin	Cured
	10/M	Fever for 1 monthand pain in abdomen for 7 days	Solitary splenic abscess	19,200	*S. typhi*	Sterile	Positive 1: 160			70 mL drained followed by deroofing of abscess cavity		Ceftriaxone and ofloxacin	Cured
Hota, 2009/India[6]	21/M	Fever for 10 days	Multiple splenic abscess	6,900	*S. typhi*	Sterile	O 1:80			400 mL pus drained	Yes	Ceftriaxone 2 gm BD for 1 week then cipro 500 mg BD for 7 days	Cured
	19/M	Fever for 5 days	Solitary splenic abscess		Not done	*S. paratyphi* A	O 1:80			Aspiration done		Cipro 200 mg IV for 5 days/ ceftriaxone 2 gm BD	Cured
Naranje et al., 2011/India[7]	6/F	Fever for 3 weeks and diffuse abdominal pain for 2weeks, jaundice for 10 days	Multiple splenic abscess	18,530	Sterile	*S. typhi*	H 1:320			CT-guided aspiration of the largest abscessyielded only 2 mL pus		Ceftriaxone 4 weeks	Cured
Doddaiah et al., 2012/India[8]	13/M	High-grade fever, diffuse intermittent abdomen pain for 8 days/nausea, loose stools for 3 days	Multiplesplenic abscesses	13,200	*S. typhi*	Sterile	Negative			USG-guided aspiration	Yes	Ceftriaxone for 3 weeks	Cured
Sudhaharan et al., 2014/India[9]			–		*S. typhi*	–				Percutaneous drainage		Ceftriaxone	Cured
			–		*S. paratyphi* A	–				Percutaneous drainage		Ciprofloxacin	Cured

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Authors/year/country	*Age/sex*	*Presentation*	*Radiology*	*Total WBC (cells/mm^3)*	*Pus aspirate culture*	*Blood culture*	*Widal*	*Typhi-dot*	*Lung*	*Drainage*	*Splenectomy*	*Antibiotics*	*Outcome*
Bhongle et al., 2013/India[10]	14/F	Fever with chills and pain in abdomen on the left side	Multiple splenic abscesses	11,000	*S. typhi*	Sterile	O and H 1:320			USG-guided aspiration		Amoxi-clav then ceftriaxone sulbactam	Cured
Sonavane et al., 2015/India[11]	9/F	Fever, nausea, and abdominal pain for 2 days. Intermittent course of similar episodes for last 1 year	Multiple splenic abscess	22,200	*S. typhi*	Not done				450 mL fluid aspirated		Ceftriaxone 7 days	Cured
Sahu and Talwalkar, 2015/India[12]	34/F	Dry cough on and off for 1.5 months with mild fever with shivering and diaphoresis	Solitary splenic abscess	7,400	*S. paratyphi* A	Sterile			Lt pleural effusion/CT-lung atelectasis	CT-guided aspiration		Amoxiclav for 7 days	Cured
Handa et al., 2015/Srilanka[13]	20/M	Fever for 5 days	Multiple splenic abscess	3,700	Sterile	*S. typhi*			CT-pleural effusion	Aspirations were done on two occasions		Ceftriaxone for 5 days/then piptaz	Cured
Sharavanan et al., 2016/India[14]	20/M	Fever high-grade, intermittent for >2 months	Multiloculated hypodense lesion in the upper pole of the spleen	5,200	*S. typhi* from intra-operative pus	Not done	O 1:80, H 1:40			–	Yes, since multiloculated	Cefoperazone but no response	Cured
Sahu et al., 2017/India[15]	19/M	Fever with chillsand rigor, jaundice for 15 days and pain in abdomen, left shoulder pain, and jaundice for 7 days	Solitary splenic abscess	28,500	*S. typhi*	Sterile	O and H 1:320	Positive	CT-pleural effusion	USG-guide-daspiration and pigtail catheter wasinserted	Yes due to rupture of splenic abscess into pleural cavity	Ceftriaxone	Cured
Shamanna et al., 2017/India[16]	45/F	Low-grade fever with chills, rigors, and abdominal pain for 10 days	Splenic abscess with partial thrombosis of left portal vein and splenic vein, cholelithiasis with minimal left pleural effusion and hepatosplenomegaly	15,000	*S. typhi*	Not done			CT-Lt pleural effusion	USG-guide-daspiration and pigtail catheter wasinserted		Amikacin, amoxicillin + clavulanic acidfor 7 days	Cured
Jha and Vidhale, 2018/India[17]	36/M	Fever for 5 days, associated with chills and severe noncolicky-pain in left hypochondriac region of 3 days	Multiple splenic abscess	14,000		*S. typhi*		Positive		USG-guide-daspiration and pigtail catheter wasinserted	No	Ceftriaxone and amikacin for 2 weeks/then meropenem and clindamycin	Cured

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Authors/year/country	*Age/sex*	*Presentation*	*Radiology*	*Total WBC (cells/mm^3)*	*Pus aspirate culture*	*Blood culture*	*Widal*	*Typhi-dot*	*Lung*	*Drainage*	*Splenectomy*	*Antibiotics*	*Outcome*
Khan, 2019/Qatar[18]	25/M	Fever and left upper abdominal pain for 7 days	Multiple splenic abscess		*S. typhi*	*S. typhi*					No	Piptaz for 4 weeks	Cured
Dutta and Chatterjee, 2020/India[19]	19/F	High-grade intermittent fever for7 days, abdominal pain, nausea, and vomiting for2 days and loose stools for 3 days	Multiple splenic abscess and atelectatic changes in the left lung basesuggestive of infarcts and abscesses	Leukocytosis		*S. typhi*	Negative		CT-lung atelectasis		No	Ceftriaxone 2 gm BD for 7 days/cefixime 200 mg twice daily/after readmission, ceftriaxone 2 gm BD and meropenem 1 gm TDS fora month	Cured
Kaur et al., 2021/India[20]	20/M	Abdominal pain for 2 weeks/fever with chills	Solitary splenic abscess	11,000	*S. typhi*	Sterile	O 1:160, H 1:320	Positive		USG-guided percutaneous drain and 90 mL purulent fluid drained	No	Meftriaxone and azithro for 5 days	Cured
Zubair et al., 2021/Pakistan[21]	18/M	Fever with rigors, anorexia, and pain in left side of abdomen for 1 month	Multiple splenic abscess		Not done	*S. typhi*	O 1:160 H 1:40			–	No	Meropenem and azithro for 2 weeks	Cured
Gupta et al., 2022/India[22]	15/M	Fever with chills and left hypochondrium pain for 1 month	Multiple splenic abscess	2,500	*S. typhi*	Sterile				USG-guided aspiration	No	Ceftriaxone 2 gm BD	Cured
Navik et al., 2023/India[23]	5/M	Fever, decreased appetite, and abdomen distension	USG normal. CT abdomen showed multiple splenic abscess	6,800		*S. typhi*	1 in 256			–	No	Meropenem 3 weeks	Cured
Shaji et al., 2023/India[24]	25/M	Abdominal discomfort, over left side/high-grade fever with chills. Several episodes of vomiting associated with nausea and decreased appetite	Solitary splenic abscess	12,210		Sterile	H 1:160		CT-pleural effusion	–	No	Piperacillin 3.75 gm TDS/after culture azithro 500 mg OD for 2 weeks	Cured
Gupta et al., 2023/India[25]	16/M	High-grade fever for 7 days and left-sided-lower chest pain	Multiple splenic abscess with left-sided pleural effusion and consolidation			*S. typhi*			CT-Lt pleural effusion	USG-guidedsplenic aspiration200 mL of pus	No	IV antibiotics 4 weeks and 2 weeks of oral antibiotics	Cured

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Authors/year/country	*Age/sex*	*Presentation*	*Radiology*	*Total WBC (cells/mm^3)*	*Pus aspirate culture*	*Blood culture*	*Widal*	*Typhi-dot*	*Lung*	*Drainage*	*Splenec-tomy*	*Antibiotics*	*Outcome*
Pius et al., 2023/India[26]	33/M	High-grade fever with chills for 6 days and abdominal pain for 4 days	Multiple splenic abscess	15,000	Sterile	*S. typhi*		Positive		USG-guided percutane-ous drain using pigtail catheter 220 cc pus	No	Ceftriaxone and amikacin for 2 weeks/ then IV mero-penem and clindamycin for 2 weeks	Cured
Dubey et al., 2023/India[27]	23/M	High-grade fever with chills and rigor for 4 weeks, pain in left upper abdomen for 3 weeks, headache for 1 week, and vomiting for 2 days			*S. typhi*					Diagnostic tapping	No	Meropenem 7 days/oral cefexime and doxy for 7 days	Cured
Sundaresan et al., 2023/ India[28]	71/M	Fever,generalized weakness, left sided chest pain and left upperquadrant ab-dominal pain on and off for 17 days	Well definedcollection measuring 4 × 5.3 × 5 cm in ventraland superior aspect of the spleen, minimal left pleural effusion	6,250	*S. typhi*	Sterile			CT-minimal pleural effusion	CT-guided aspiration15 mL of pus was aspirated	No	Cefepime IV for 4 weeks/ oral cefixime 200 mg BD for 2 weeks	Cured
Gamage et al., 2023/ Srilanka[29]	22/F	High-grade fever, chills, and rigors/mild diffuse abdominal pain for 2 weeks	Solitary splenic abscess		*S. typhi*	Not done				USG-guide-daspiration		Meropenem 1 gm TDS and subsequently downgraded to ceftriaxone 1 gm BD for 14 days and switched to oral cipro-floxacin 500 mg BD for another 2 weeks	Cured

Amoxyclav, amoxicillin clavulanate; Azithro, azithromycin; Cipro, ciprofloxacin; IV, intravenous; Piptaz, piperacillin tazobactam

radiological findings, treatment, and outcome of the cases.

Clinical Characteristics

About 26, 22, and 1 case each were reported from India, Sri Lanka, Turkey, Qatar, and Pakistan, respectively. *S. typhi* and *S. paratyphi* A were reported in 29 and 4 cases, respectively. Complete clinical details could not be extracted for three cases. Among the remaining 30 cases, the mean age was 21 years (range 5–71 years), with 13 pediatric cases. Eight were females. Twenty-eight patients were immunocompetent, and two patients had diabetes mellitus. Two patients sustained blunt trauma to the left side of the abdomen prior to presentation, and another patient had a similar episode of splenic abscess 5 years ago, which was managed conservatively with pigtail drainage.

Laboratory Diagnosis

Blood culture was positive in 13 cases, and pus aspirate from abscess grew the isolate in 20 cases. Additionally, *Salmonella* was isolated from stool to pleural fluid in one case each. USG of the abdomen was diagnostic of splenic abscess in 28 cases and normal in two cases. CT abdomen was diagnostic in all 27 cases tested. About 17, 12, and 1 patient showed multiple abscesses, a solitary lesion, and a multiloculated lesion, respectively. Widal test showed positive results in 15 of 18 tested, and Typhidot was positive for IgM and IgG in all four cases tested. Two cases were also positive for Leptospira IgM antibodies by ELISA.

Treatment

Antibiotics administered include ceftriaxone (70%), meropenem (20%), fluoroquinolone (20%), amoxicillin clavulanate (10%), piperacillin tazobactam (6%), azithromycin (6%), and cefixime (6%). USG/CT-guided percutaneous drainage was carried out in 25 cases, and splenectomy was performed in seven cases. In splenectomized patients, five had multiple splenic abscesses, one had a multiloculated collection, and in another case, splenectomy was considered due to rupture into the pleural cavity. In four of the seven splenectomized cases, percutaneous drainage was initially performed.

Outcome

Respiratory complications were observed in nine cases, which were identified by abnormal chest X-ray in four cases and by CT imaging in the others. Findings included left pleural effusion in all nine cases, concurrent lung atelectasis in two cases, and consolidation in another case. All 33 patients recovered from the infection.

Discussion

The incidence of splenic abscess in typhoid fever is 0.29–2%.[30] Recently, many cases of splenic abscess due to typhoidal *Salmonella* have been reported in India. Preceding splenic injury and bacteremia are requisites for an abscess to develop. In the reviewed literature, two patients sustained blunt trauma, and 13 cases had positive blood cultures. Given the nonspecific clinical presentation of splenic abscess, which mimics other conditions such as pneumonia and pyelonephritis, clinical diagnosis is challenging. However, USG and CT (the gold standard) play a major role in diagnosis and treatment. There are no current treatment guidelines for splenic abscess due to *Salmonella*. In most reports, ceftriaxone was used, with the duration ranging between 1 and 4 weeks. Though appropriate antibiotics are of paramount importance, to circumvent fulminant and grave infection, drainage of the abscess is very important. Depending on the abscess characteristics, management varies. Percutaneous aspiration is fruitful in the case of unilocular or bilocular abscesses with a complete thick wall without internal septations. For multilocular abscesses with ill-defined cavities, thick necrotic debris, and viscous collections, either laparoscopic or open surgery may be required. Splenic abscess, if left untreated, can lead to many complications such as left-sided pleural effusion, pneumothorax, atelectasis, pneumonia, and others like subdiaphragmatic abscess, gastric or intestinal perforation, and pancreatic fistula. The prognosis of splenic abscess has remarkably improved in recent times with the use of CT-guided percutaneous drainage. Splenectomy remains an extreme option, as most cases are managed with percutaneous drainage and antibiotics. Clinical diagnosis of splenic abscess due to *Salmonella* can be taxing, provided the unconventional descriptions in the published works. By virtue of this report, we aspire to augment awareness among health professionals regarding this uncommon entity and foresee it in pertinent contexts.

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