

Severe Acute Appendicitis Following *Salmonella typhi* Infection in a 10-Year-Old Male Child: An Under-Recognized Pediatric Association

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Abstract

Background: Typhoid fever remains a major public health concern in developing countries, particularly in pediatric populations due to unsafe drinking water, inadequate sanitation, overcrowding, and limited vaccination coverage. Children are more vulnerable to enteric fever and its complications because of immature immunity and higher exposure risk. Although gastrointestinal manifestations such as abdominal pain, diarrhea, and constipation are common, acute appendicitis secondary to *Salmonella typhi* infection is rarely recognized and frequently misdiagnosed due to overlapping clinical features.

Case Presentation: We present a detailed case of a 10-year-old male child with laboratory-confirmed typhoid fever who subsequently developed severe acute appendicitis. Persistent high-grade fever and progressive localization of abdominal pain to the right lower quadrant prompted further diagnostic evaluation. Ultrasonography revealed classical features of acute appendicitis, and emergency appendectomy was performed. The child showed complete clinical recovery following combined medical and surgical management.

Results: Early identification of evolving localized abdominal pathology, timely radiological assessment, and prompt surgical intervention resulted in an uneventful postoperative course and prevention of complications such as perforation and peritonitis.

Conclusion: Acute appendicitis shall be considered an important yet under-recognized complication of typhoid fever in children presenting with persistent or localized abdominal pain. Increased awareness and early imaging can significantly reduce morbidity and improve outcomes in endemic regions \.

Keywords: Acute appendicitis, Typhoid fever, *Salmonella typhi*, Pediatric infection, Acute abdomen

BACKGROUND

Typhoid fever, caused by *Salmonella enterica* serovar Typhi, is a systemic bacterial infection transmitted primarily through contaminated food and water. Despite global efforts toward disease control, typhoid fever continues to pose a significant health burden in low- and middle-income countries, particularly in South Asia and parts of Africa. Children represent a high-risk group due to increased exposure, poor hygiene practices, and limited access to preventive healthcare services, including vaccination.

Clinically, typhoid fever in children is characterized by prolonged fever, abdominal pain, anorexia, diarrhea or constipation, hepatosplenomegaly, and systemic toxicity. These nonspecific manifestations often complicate early diagnosis and delay recognition of complications. Gastrointestinal involvement is common, but surgical complications are relatively uncommon and often present late.

Acute appendicitis is the most frequent cause of emergency abdominal surgery in children. The pathogenesis typically involves obstruction of the appendiceal lumen by lymphoid hyperplasia, fecaliths, or inflammation, followed by bacterial proliferation, ischemia, and possible perforation if untreated. Pediatric appendices contain abundant lymphoid tissue, making them particularly susceptible to inflammatory enlargement during systemic infections.

Although intestinal complications of typhoid fever such as ileal ulceration, hemorrhage, and perforation are well documented, appendicitis secondary to *Salmonella typhi* infection remains poorly described in literature. Overlapping clinical features between enteric fever and appendicitis often lead to misdiagnosis, delayed intervention, and increased morbidity. This report aims to elaborate a rare but clinically significant association and highlight the importance of early imaging and multidisciplinary management.

Epidemiology and Prevalence

Globally, an estimated 11–20 million cases of typhoid fever occur annually, resulting in approximately 128,000–161,000 deaths each year, with the highest burden in children aged 5–15 years. In India, typhoid fever remains endemic due to inadequate sanitation, overcrowding, and limited access to clean drinking water.

Acute appendicitis has a lifetime risk of 7–8%, with peak incidence during late childhood and adolescence. However, appendicitis occurring as a complication of typhoid fever is under-reported, and its true prevalence remains unknown. Many cases are likely misclassified as nonspecific abdominal pain associated with enteric fever, leading to underestimation of this association.

Due to underdiagnosis and incorrect classification as "typhoid abdomen," appendicitis linked to typhoid fever is not frequently reported, and its actual incidence is still unknown. Raising awareness is crucial, especially in endemic environments.

Uniqueness of the Study

This case report is unique because it documents a rare and under-recognized surgical complication of typhoid fever in a pediatric patient, where *Salmonella typhi* infection directly preceded the development of severe acute appendicitis. While typhoid fever is commonly associated with gastrointestinal manifestations such as ileitis, intestinal hemorrhage, and perforation, involvement of the appendix remains infrequently reported in medical literature, particularly in children.

The diagnostic challenge in this case arises from the significant overlap between the clinical features of typhoid fever and acute appendicitis, including prolonged fever, abdominal pain, vomiting, and systemic toxicity. In endemic regions, these symptoms are often attributed to uncomplicated enteric fever, leading to delayed imaging and surgical referral. This case is distinctive in demonstrating how persistent fever with progressive localization of abdominal pain served as a critical clinical clue for early diagnosis of appendicitis.

Furthermore, histopathological evidence of acute suppurative appendicitis with lymphoid hyperplasia supports the proposed pathophysiological mechanism of infection-triggered appendiceal inflammation in children. By highlighting this rare association, the present case contributes valuable evidence to the limited body of literature and underscores the importance of maintaining a high index of suspicion for appendicitis in pediatric typhoid patients.

Scope of the Study

The scope of this study extends beyond a single case description by emphasizing its clinical, diagnostic, and public health relevance. Clinically, this report reinforces the importance of thorough and repeated abdominal examinations in children diagnosed with typhoid fever, especially when abdominal pain persists or becomes localized. It supports the routine consideration of appendicitis as a differential diagnosis in pediatric patients with enteric fever presenting with right lower quadrant pain.

From a diagnostic perspective, this case highlights the crucial role of early imaging, particularly ultrasonography, in distinguishing between uncomplicated typhoid abdomen and acute surgical conditions. Incorporating early radiological evaluation into diagnostic protocols may reduce diagnostic delay and prevent severe complications such as perforation, peritonitis, and sepsis.

From a broader perspective, this study provides a foundation for future research aimed at determining the true prevalence, clinical predictors, and pathophysiological mechanisms of typhoid-associated appendicitis. The findings may contribute to the development of evidence-based guidelines and clinical algorithms for the management of abdominal pain in children with typhoid fever, particularly in endemic regions where disease burden is high.

Case Presentation

A 10-year-old boy who had been experiencing abdominal pain for three days and a high-grade fever for seven days arrived at the emergency room. The persistent fever was accompanied by anorexia, vomiting, and widespread weakness. The abdominal pain was initially widespread but eventually restricted to the lower right quadrant.

Based on laboratory tests, the patient was diagnosed with typhoid fever five days prior and was undergoing antibiotic treatment. Abdominal pain got worse despite treatment, so more testing was necessary.

Clinical Examination

On examination, the child appeared ill and febrile (102°F). Pulse rate was 108/min and blood pressure was within normal limits. Abdominal examination revealed tenderness, guarding, and rebound tenderness in the right iliac fossa. Rovsing's sign was positive. No hepatosplenomegaly was noted.

Investigations

Laboratory Findings

- Hemoglobin: 11.2 g/dL
- Total leukocyte count: 4,500 / μ L
- Platelet count: 1.5×10^5 / μ L
- C-reactive protein: Elevated
- Erythrocyte sedimentation rate: Elevated
- Blood culture: Positive for *Salmonella typhi*.

Diagnosis

Severe acute appendicitis following *Salmonella typhi* infection

Management

Initial management focused on stabilizing the patient and controlling the ongoing systemic infection. Intravenous fluid resuscitation was initiated to correct dehydration and maintain hemodynamic stability.

Broad-spectrum intravenous antibiotics, including ceftriaxone to treat *Salmonella typhi* and metronidazole for anaerobic coverage, were administered to address both enteric infection and potential intra-abdominal contamination.

Despite appropriate antimicrobial therapy, the persistence and localization of abdominal pain raised strong suspicion of an acute surgical abdomen. Considering the high risk of appendiceal perforation, peritonitis, and sepsis in pediatric patients, an emergency appendectomy was performed without delay. Early surgical intervention was crucial in preventing further complications and disease progression.

Intra-operative Findings

Intra-operative exploration revealed a markedly inflamed, congested, and edematous appendix. There was no evidence of perforation, gangrene, or peri-appendiceal abscess, indicating that surgical intervention was undertaken at an early stage of disease progression. The surrounding bowel and peritoneal cavity appeared normal, further supporting timely diagnosis and management.

Histopathology

Histopathological examination of the resected appendix demonstrated features of acute suppurative appendicitis, characterized by transmural inflammatory infiltrates and prominent lymphoid hyperplasia. These findings support the hypothesis that systemic infection with *Salmonella typhi* can trigger exaggerated lymphoid response within the appendix, leading to luminal obstruction and acute inflammation, particularly in children.

Outcome and Post-Management Course

The postoperative course was uneventful. The patient became afebrile within 48 hours, and abdominal pain gradually resolved. Oral feeding was resumed progressively once bowel sounds returned, and antibiotic therapy was continued to ensure complete eradication of infection. The child was discharged on the sixth postoperative day in stable condition with advice for follow-up and supportive care.

At the two-week follow-up visit, the patient remained asymptomatic, with no residual abdominal complaints or postoperative complications, confirming complete clinical recovery.

Results

This case clearly demonstrates that early recognition of persistent and localized abdominal pain in children with typhoid fever, combined with timely imaging and prompt surgical intervention, leads to excellent clinical outcomes. Early appendectomy prevented serious complications such as appendiceal perforation, generalized peritonitis, prolonged hospitalization, and sepsis. The findings reinforce the importance of a combined medical–surgical approach in managing atypical abdominal presentations of typhoid fever in the pediatric population.

Outcome and Follow-Up

Post-operative recovery was uneventful. Fever subsided within 48 hours, abdominal pain resolved, and oral feeding was resumed. The patient was discharged on the sixth postoperative day in stable condition. Follow-up after two weeks revealed complete recovery.

Specification of the Study:

This case is unique because it shows a rare complication of typhoid fever in a child, where *Salmonella typhi* infection led to severe acute appendicitis. Since typhoid fever and appendicitis have similar symptoms like fever and abdominal pain, the condition can be easily missed. In this case, persistent pain in the right lower abdomen and timely laboratory and ultrasound findings helped in early diagnosis. Early surgical treatment prevented serious complications, highlighting the importance of careful monitoring in pediatric typhoid patients.

Discussion

Appendicitis associated with typhoid fever is considered an uncommon but clinically important complication, particularly in the pediatric population. The proposed pathophysiological mechanisms include lymphoid hyperplasia leading to appendiceal luminal obstruction, direct invasion of *Salmonella typhi* into the appendiceal wall, and secondary inflammation of the ileocecal region. In children, the appendix contains abundant immunologically active lymphoid tissue, which responds vigorously during systemic infections, thereby increasing susceptibility to inflammatory enlargement and obstruction.

The clinical presentation of typhoid-associated appendicitis often poses a diagnostic challenge due to significant symptom overlap between enteric fever and acute appendicitis. Common features such as prolonged fever, abdominal pain, nausea, and vomiting are frequently attributed to uncomplicated typhoid fever, especially in endemic regions, leading to delayed recognition of an evolving surgical abdomen. In this context, progressive localization of abdominal pain to the right lower quadrant, persistence of fever despite antibiotic therapy, and localized peritoneal signs should prompt further investigation.

This case highlights the crucial role of imaging, particularly ultrasonography, in differentiating typhoid-related abdominal pain from acute appendicitis in children. Early radiological evaluation enables timely surgical intervention and significantly reduces the risk of complications such as perforation, peritonitis, and sepsis. The favorable outcome observed in this patient underscores the importance of a multidisciplinary approach involving pediatricians, surgeons, and radiologists in managing complex presentations of typhoid fever.

Limitations of the Study

The present report has certain limitations. As a single-case study, the findings cannot be generalized to all pediatric patients with typhoid fever. Advanced imaging modalities such as computed tomography were not utilized due to pediatric safety considerations. Additionally, microbiological culture of appendiceal tissue was not performed, which could have provided direct evidence of bacterial involvement. Despite these limitations, the case remains clinically significant by drawing attention to a rare and under-recognized complication of typhoid fever and emphasizing the need for heightened diagnostic vigilance.

Conclusion

Acute appendicitis can occur as an under-recognized complication of *Salmonella typhi* infection in children. Clinicians should maintain a high index of suspicion in pediatric patients with typhoid fever presenting with localized abdominal pain. Prompt diagnosis and timely management lead to excellent outcomes.

Future Scope

- Identification of early laboratory markers to predict appendicitis in typhoid patients
- Use of advanced microbiological and molecular techniques to confirm *Salmonella typhi* involvement
- Strengthening antimicrobial susceptibility testing to guide effective treatment
- Development of lab-based diagnostic algorithms for early surgical referral
- Reporting of similar cases to determine true prevalence and improve outcomes

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