

## Case Report:

# Acute Appendicitis Associated With Typhoid Fever: A Case Report and Review of Literature



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## ABSTRACT

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### Key Words:

Appendicitis, Child, Typhoid fever

**Introduction:** Appendicitis could be a rare complication of *Salmonella Typhi* infection.

**Case Presentation:** we present a 13-year-old girl with typhoid fever with histology-proven acute appendicitis as a rare complication of *Salmonella Typhi* infection. The patient was admitted to the hospital with the chief complaints of fever, abdominal pain, diarrhea, and vomiting for more than one week. A brief review of relevant literature was also performed to explore more this rare cause of a common emergency surgical procedure.

**Conclusions:** In all cases with typhoid fever with persistent diarrhea and vomiting, localized abdominal pain, probable acute appendicitis should be considered as an important complication.

## 1. Introduction

*Salmonella* spp has two types of typhoidal and non-typhoidal (1, 2). *Salmonella enterica* serovar *Typhi* is the causative agent of Typhoid Fever (TF), which is one of the important causes of mortality among children in developing countries (3, 4). The disease is more prevalent in developing countries like Iran and has a wide range of gastrointestinal and systemic manifestations such as fever, malaise, anorexia, depression, diarrhea (more prominent in children), constipation (more in adults), vomiting, hepatosplenomegaly, and skin rash (5). TF may be associated with appendicitis

as the primary presentation since the agent can lead to hyperplasia in the lymphoid tissue of the appendix or direct luminal invasion (1). There are a few reports regarding appendicitis presentation in cases with TF (6, 7). Here, we report a child with TF presenting with acute appendicitis.

## 2. Case Presentation

A 13-year-old girl was admitted to our hospital with the chief complaints of fever, abdominal pain, and diarrhea more than 7-8 times/day and daily vomiting for more than one week. She had periumbilical abdominal pain (for 3 days) worsened before defecation.

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Her growth rate was normal. Her weight was 32 kg. Before admission, she was treated with cefixime 200 mg and metronidazole syrup (15 mL) daily for three days. At the time of admission, she had mild to moderate dehydration and her vital signs were temperature: 38°C, PR: 90/min, RR:18/min, and BP:100/60 mm Hg.

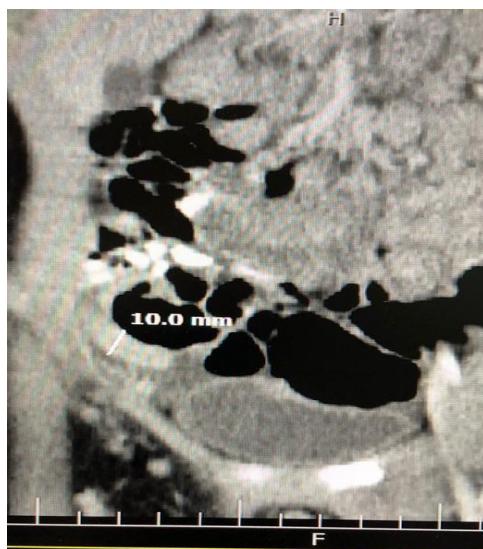
Clinical examinations showed tenderness in periumbilical and right lower quadrant regions, which was persistent. Laboratory test results were as follows:

CBC (complete blood count): white blood cells:  $11.8 \times 10^3 / \mu\text{L}$ , polymorphonuclear cells: 45%, lymph: 42%, monocyte: 1%, band cell: 2%, hemoglobin: 12.6 g/dL, platelet:  $263 \times 10^3 / \mu\text{L}$ , erythrocyte sedimentation rate: 55 mm/h, C-reactive protein: 45 mg/dL. Also, her blood sugar, blood urea nitrogen, creatinine, sodium, potassium, calcium, phosphorus, magnesium, liver function test, amylase, and lipase were within normal range.

Urine analysis was normal. Urine culture was negative. The stool examination result was WBC: 30-40, RBC: 30-40.

Her blood culture came negative, but stool culture came positive with *Salmonella Typhi* (48 hours after admission), sensitive to cefotaxime. Her Widal test results were TO=1/160, TH=1/160 (at admission), after one week TO=1/320, TH=1/320.

The patient was hydrated and treated with intravenous cefotaxime as bacterial gastroenteritis, then TF was diagnosed but her abdominal pain was persistent.



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**Figure 1.** Abdominopelvic CT scan showing acute appendicitis

Her abdominal ultrasound results indicated normal liver, gallbladder, bile ducts, and pancreas but the blind-ended loop of her appendix was enlarged (8 mm), non-compressible, with a little fluid around it and lymphadenopathy.

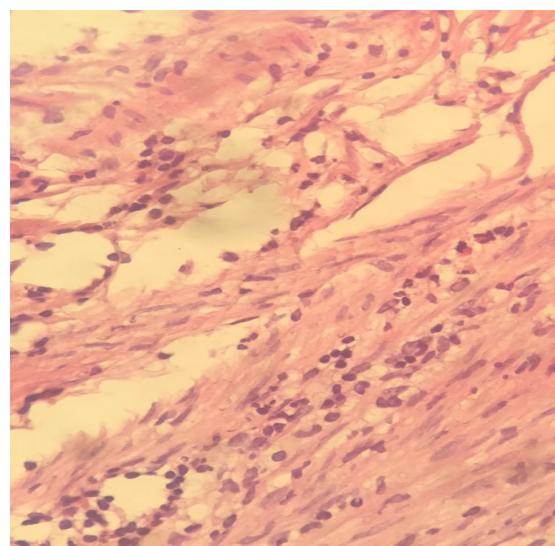
Her abdominopelvic CT scan also showed normal liver, gallbladder, bile ducts, pancreas, and kidneys, but it indicated a 10-mm-diameter dilated appendix with free fluid around it and fat stranding, suggesting early acute appendicitis ([Figure 1](#)). Therefore, metronidazole injections were added to the patient's medications to cover the treatment of acute appendicitis ([8](#)).

After a surgical consultation, the patient underwent appendectomy 7 days after admission, and her pathological examinations revealed that the mucosa was relatively normal. In lamina propria, a large number of lymphoid follicles of various sizes have germinal centers in which the tangible macrophage cells were evident. There were some eosinophils in the muscle layer. Blood vessels in the serous part were compatible with early acute appendicitis ([Figure 2](#)). After 14 days of therapy by cefotaxime and metronidazole, she was discharged in a good condition and was symptom-free during the follow-up period.

### 3. Discussion and Review of Literature

To the best of my knowledge, this is one of the rare cases of appendicitis presentation associated with TF.

According to the literature, TF could present with mesenteric lymphadenopathy, ileocolitis, and even



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**Figure 2.** Pathology of early acute appendicitis

bowel perforation, which mimic appendicitis (1, 5). *Salmonella Typhi* could reproduce in the submucosa, resulting in hyperplasia and hypertrophy of mesenteric lymphoid and intestinal tissues as well as Peyer's patches. Hypertrophy followed by necrosis of the submucosal tissues may be responsible for abdominal pain and its following ileal hemorrhage and or perforation. Because of macroscopic or microscopic breaches in the intestinal mucosal barrier, the patients affected with enteric fever probably develop secondary bacteremia with other organisms (9-11).

Most often, nonspecific obstruction of the appendiceal lumen causes appendicitis. An enlarged lymphoid follicle in the epithelial lining, undigested food, fecal material, other foreign material, and bent or twisted organ may be responsible for appendicitis. The colicky pain which, in turn, generates the poor periumbilical abdominal pain as a typical presentation of early appendicitis is caused by appendiceal lumen obstruction which leads to its dilation and wall thickness, too (12).

Less often, enteric pathogens might produce localized appendiceal lymphoid hyperplasia with an obstruction or directly infect the appendix (13).

Only a few percentages of acute appendicitis are presented with culture-proven enteritis. There is doubt about the clear pathogenesis of acute appendicitis and TF; primary appendicular lumen obstruction due to lymphoid hyperplasia or direct bacterial invasion to the appendix (6). Our case first presented with febrile abdominal pain associated with non-bloody vomiting and diarrhea with culture-positive TF symptoms as well as acute appendicitis.

Sartori et al. reported a case who was a 30-year-old man presented with fever and diarrhea for one week

(6). He had positive blood and stool cultures. Besides, his abdominal CT showed a thickened appendix with no free fluid or exudates. The case of the present study presented with fever and non-bloody watery diarrhea with negative blood culture and positive stool culture. Ultrasound and CT scan evaluations revealed that the appendix was thickened with free fluid around it.

Lau et al. reported a 52-year-old woman presented with fever, abdominal pain, vomiting, and diarrhea (2) who had hyponatremia, hypokalemia, and elevated liver enzymes. Ultrasound examination revealed appendicitis. She underwent an appendectomy and was recovered. Wong et al. reported a 78-year-old man with salmonella bacteremia complicated by acute appendicitis (7).

Some authors reported that TF may present with acute abdomen symptoms in children and mimicking acute appendicitis (14-16) (Table 1). Kazlow et al. presented a 13-year-old girl with abdominal pain at the right lower quadrant of the abdomen. The child underwent an appendectomy. The cultural examination of the appendix and stool confirmed *Salmonella typhimurium* infection (14).

Kumar et al. presented a 13-year-old boy with fever, abdominal pain, and vomiting. Sonography revealed a non-compressible tubular structure with a maximal diameter of 7 mm (appendix), multiple enlarged mesenteric lymph nodes, and minimal fluid collection in the right iliac fossa. Based on clinical presentation and sonographic findings, acute appendicitis was diagnosed and appendectomy was done (15).

Likitnukul reported a 14-year-old female with signs of appendicitis and subsequently proved to have mes-

**Table 1.** Previous case reports

Author(s)	Year of study	Age (y)	Sex	Clinical and Radiographic Features
Kazlow et al. (14)	1991	13	Female	Abdominal pain, non-bilious vomiting, non-bloody diarrhea and fever, pathologic-proven nongangrenous appendicitis
Kumar KJ et al. (15)	2015	13	Male	Fever, abdominal pain, and vomiting, sonography revealed a non-compressible tubular structure with a maximal diameter of 7 mm (appendix), multiple enlarged mesenteric lymph nodes, and minimal fluid collection in the right iliac fossa
Likitnukul S (16)	2002	14	Female	Presented with signs of appendicitis and subsequently proved to have mesenteric adenitis owing to <i>Salmonella Typhi</i> which responded to treatment with ceftriaxone

enteric adenitis owing to *Salmonella Typhi* which responded to treatment with ceftriaxone (16).

There is no evidence if the pathogen directly invades the appendix or causes an obstruction through lymphoid proliferation (6). In the current study, the pathology examination confirmed the acute appendicitis diagnosis and showed that appendectomy possibly was the right therapeutic approach. These findings suggested a differential diagnosis of acute appendicitis in cases presented with febrile abdominal pain associated with persistent diarrhea or vomiting.

## 5. Conclusions

In typhoid fever, appendicitis can be considered as a possible but rare differential diagnosis in children with diarrhea, vomiting, and persistent abdominal pain associated with persistent fever.

## Ethical Considerations

### Compliance with ethical guidelines

This study was approved by Health Research Institute of Babol University of Medical Sciences (Code: IR.MUBABOL.REC. 1399.128).

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## References

- García-Corbeira P, Ramos JM, Aguado JM, Soriano F. Six cases in which mesenteric lymphadenitis due to non-typhi *Salmonella* caused an appendicitis-like syndrome. *Clinical Infectious Diseases*. 1995; 21(1):231-2. [DOI:10.1093/clinids/21.1.231] [PMID]
- Lau SKP, Woo PCY, Chan CYF, Woo WL, Woo GKS, Yuen KY. Typhoid fever associated with acute appendicitis caused by an H1-j strain of *Salmonella enterica* serotype *Typhi*. *Journal of Clinical Microbiology*. 2005; 43(3):1470-2. [DOI:10.1128/JCM.43.3.1470-1472.2005] [PMID] [PMCID]
- Prasad N, Jenkins AP, Naucki L, Rosa V, Sahu-Khan A, Kama M, et al. Epidemiology and risk factors for typhoid fever in Central Division, Fiji, 2014-2017: A case-control study. *PLoS Neglected Tropical Diseases*. 2018; 12(6):e0006571. [DOI:10.1371/journal.pntd.0006571] [PMID] [PMCID]
- Mweu E, English M. Typhoid fever in children in Africa. *Tropical Medicine & International Health*. 2008; 13(4):532-40. [DOI:10.1111/j.1365-3156.2008.02031.x] [PMID] [PMCID]
- Parry CM, Hien TT, Dougan G, White NJ, Farrar JJ. Typhoid fever. *The New England Journal of Medicine*. 2002; 347(22):1770-82. [DOI:10.1056/NEJMra020201] [PMID]
- Sartori DJ, Sun K, Hopkins MA, Sloane MF. Typhoid fever and acute appendicitis: A rare association not yet fully formed. *Case Reports in Gastroenterology*. 2017; 11(2):446-51. [DOI:10.1159/000479310] [PMID] [PMCID]
- Wong SY, Lee SKL, Er C, Kuthiah N. Appendicitis in non-typhoidal salmonella bacteraemia. *Oxford Medical Case Reports*. 2018; 2018(11):omr082. [DOI:10.1093/omcr/omr082] [PMID] [PMCID]
- Litz CN, Asuncion JB, Danielson PD, Chandler NM. Timing of antimicrobial prophylaxis and infectious complications in pediatric patients undergoing appendectomy. *Journal of Pediatric Surgery*. 2018; 53(3):449-51. [DOI:10.1016/j.jpedsurg.2017.05.005] [PMID]
- Toapanta FR, Bernal PJ, Fresnay S, Darton TC, Jones C, Waddington CS, et al. Oral wild-type *Salmonella typhi* challenge induces activation of circulating monocytes and dendritic cells in individuals who develop typhoid disease. *PLoS Neglected Tropical Disease*. 2015; 9(6):e0003837. [DOI:10.1371/journal.pntd.0003837] [PMID] [PMCID]
- Hoffman SL, Punjabi NH, Kumala S, Moechtar MA, Pulungsih SP, Rivai AR, et al. Reduction of mortality in chloramphenicol-treated severe typhoid fever by high-dose dexamethasone. *The New England Journal of Medicine*. 1984; 310(2):82-8. [DOI:10.1056/NEJM198401123100203] [PMID]
- Ochoa TJ, Santisteban-ponce J. *Salmonella*. In: Cherry JD, Demmler-Harrison GJ, Kaplan SL, Steinbach WJ, Holtzman PJ, editors. *Feigin and Cherrys Textbook of Pediatric Infectious Diseases*. London: Elsevier; 2019. p. 1066-81. <https://books.google.com/books?id=bJ4ZzQEACAAJ&dq>
- Bundy DG, Byerley JS, Liles EA, Perrin EM, Katzenelson J, Rice HE. Does this child have appendicitis? *JAMA*. 2007; 298(4):438-51. [DOI:10.1001/jama.298.4.438] [PMID] [PMCID]

13. Lamps LW. Infectious causes of appendicitis. Infectious Disease Clinics of North America. 2010; 24(4):995-101. [DOI:10.1016/j.idc.2010.07.012] [PMID]
14. Kazlow PG, Freed J, Rosh JR, Reiner M, Dische R, Benkov K, et al. *Salmonella typhimurium* appendicitis. Journal of Pediatric Gastroenterology and Nutrition. 1991; 13(1):101-3. [DOI:10.1097/00005176-199107000-00019] [PMID]
15. Kumar KJ, Chavan A, Deb P, Manoli P. Acute abdomen caused by typhoid fever mimicking acute appendicitis. Malaysian Journal of Paediatrics and Child Health. 2015; 21:60-2. <https://mpaedsmy/journals/index.php/MJPCH/issue/view/12>
16. Likitnukul S, Wongsawat J, Nunthapisud P. Appendicitis-like syndrome owing to mesenteric adenitis caused by *Salmonella typhi*. Annals of Tropical Paediatrics. 2002; 22(1):97-9. [DOI:10.1179/027249302125000247] [PMID]

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