CASE REPORT

Acute infectious pancreatitis due to Salmonella typhi: Case report and literature review

Chantelli I Razafindrazoto,* Jolivet A Rakotomalala,1 Nitah H Randriamifidy,* Behoavy M Ralaizanaka,‡ Sonny Maherison,* Domaoina H Hasina Laingonirina,* Mialitiana Rakotomaharo,* Anjalaramala S Rasolonjatovo,* Andry L R Rakotozafindrabe,* Tovo H Rabenjanahary,* Soloniaina H Razafimahefa‡ and Rado M Ramanampamonjy*

*Unity of Gastroenterology, University Hospital Joseph Raseta Befelatanana, Antananarivo; †Unity of Hepato-Gastroenterology, University Hospital Mahavoky Atsimo, Mahajanga; and ‡Unity of Hepato-Gastroenterology, University Hospital Andrainjato, Fianarantsoa, Madagascar.

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Correspondence
Chantelli I Razafindrazoto, Unity of Gastroenterology, University Hospital Joseph Raseta Befelatanana, Antananarivo, Madagascar. Email: iamblaudiotchantelli@yahoo.com

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Abstract
Salmonella typhi remains an endemic disease in Madagascar. Acute pancreatitis remains a rare complication of S. typhi colitis. We presented the case of a 27-year-old male, admitted to febrile diarrhea, vomiting, and severe abdominal pain. Blood work-up revealed elevated plasma lipase level. Abdominal CT scan showed acute pancreatitis without necrosis. Blood and stool culture positivity for S. typhi. Patient was diagnosed as acute pancreatitis caused by S. typhi. The outcome was favorable under symptomatic medical treatment (rehydration and analgesic) combined with adapted antibiotic therapy. Acute pancreatitis is a possible complication of Salmonella infections. The presence of severe abdominal pain and febrile diarrhea should draw clinicians’ attention to possible Salmonella acute pancreatitis.

Introduction
Salmonella typhi infection or typhoid fever remains an endemic disease in Madagascar.1 As in low- and middle-income countries with poor water and sanitation systems, typhoid fever remains a persistent health problem in Madagascar, with an incidence of 171 per 100,000 individuals aged 5–14 years in rural setting.1,2 S. typhi is responsible for various complications (cholecystitis, appendicitis, peritonitis, prostatitis, osteomyelitis, etc.).3 Acute pancreatitis (AP) remains a rare complication of S. typhi colitis.3 Despite its high prevalence in Madagascar, no case of acute Salmonella pancreatitis has been described. We report a case of benign AP complicating infection with S. typhi.

Case report
A 27-year-old male was hospitalized for acute diarrhea with 6–7 stools per day associated with vomiting, severe periumbilical pain (visual analog scale of 9/10), and a fever of 38.5°C. He did not have a history of alcohol abuse. Clinical examination revealed periumbilical guarding with an overall tenderness abdomen. The laboratory workup reported a hyperleukocytosis at 11.3 g/L (reference range: 4–10 g/L), an increase in C reactive protein (CRP) at 157 mg/L (reference range <10 mg/L), and lipasemia at 1045 IU/L (reference range: 60 IU/L). The liver function tests were normal. Serum calcium and triglyceride level were normal. Abdominal ultrasound did not show gallstone or intrahepatic lithiasis. Abdominal CT scan revealed a swollen but homogeneous
pancreas in favor of acute edematous B-stage Balthazar pancreatitis. Blood and stool culture were positive for *S. typhi*. The antibiogram showed a multi-sensitive *S. typhi*. The outcome was favorable under symptomatic medical treatment (rehydration and analgesics) combined with third-generation cephalosporin type antibiotic therapy (Ceftriaxone) with rapid clinical improvement and apyrexia at 48 h. We ultimately retained the diagnosis of benign infectious origin acute pancreatitis due to *S. typhi*.

**Discussion**

The causes of acute pancreatitis are dominated by lithiasis and alcohol causes (>80%). Infectious origin acute pancreatitis remains a rare entity. A variety of infectious microorganisms can cause infectious pancreatitis, including viruses, bacteria, and parasites. *Salmonella* infection has been reported by several authors as a possible cause of acute bacterial pancreatitis. The description of the few reported cases of acute pancreatitis due to *S. typhi* is reported in Table 1. However, further investigation needs to be done to rule out other causes of AP and correlate the infectious agent with a disease in order to avoid misdiagnosis and, subsequently, poor management of the disease. In our patient, the diagnosis of AP was suspected due to the presence of intense epigastric pain and confirmed by a marked increase in lipasemia and a radiologic image in favor of acute edematous pancreatitis. The classic causes of AP (gallstones, alcohol, hypercalcemia, hypertriglyceridemia) have been ruled out. The presence of febrile diarrhea drew the authors’ attention to a possible infectious origin. The presence of *S. typhi* on the bacteriological samples (blood and stool culture) and the favorable outcome with symptomatic medical treatment (rehydration and analgesics) associated with an appropriate antibiotic therapy allowed us to finally retain the diagnosis of an infectious AP with *S. typhi*.

Treatment for infectious AP is no different from treatment for AP due to other causes. *Salmonella* AP is moderate in the majority of reported cases, symptomatic medical treatment is usually sufficient. The third-generation cephalosporins are currently the antibiotic therapy of choice. The initial antibiotic therapy must be adapted secondarily according to the antibiogram.

The prognosis for *Salmonella* AP was good in all reported cases, including in our patient. This could be explained by the young age of the patients and the mild nature of pancreatitis in the majority of *Salmonella* infections.

In conclusion, acute pancreatitis is a possible complication of *Salmonella* infections. The presence of pancreatic-type pain and febrile diarrhea should draw clinicians’ attention to possible *Salmonella* AP. This statement is more relevant in an area with endemic *Salmonella* infections. The prognosis was good with a favorable outcome under symptomatic medical treatment combined with appropriate antibiotic therapy.

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**Table 1** Few reported cases of acute pancreatitis due to *Salmonella typhi*

| Years [ref] | Age (years) | Sex | Clinic signs | Bacteria isolation site | Treatment | Outcome |
|-------------|-------------|-----|-------------|-------------------------|-----------|---------|
| 1991⁵       | 16          | F   | Periumbilical pain | Blood | Chloramphenicol | Favorable |
| 1993⁶       | 7           | F   | Abdominal pain, vomiting, fever, diarrhea | Stool | Ampicillin + sulbactam | Favorable |
|             | 10          | F   | Diarrhea | Stool | Cotrimoxazole + metronidazole | Favorable |
| 1998⁷       | 16          | M   | Abdominal pain, fever, headache, epistaxis | Blood | Ampicillin | Favorable |
| 2009⁸       | 11          | M   | Abdominal pain, stool anomalies, fever | Blood | Cefixime | Favorable |
| 2015⁹       | 30          | M   | Fever, headache, severe abdominal pain | Blood | Meropenem | Favorable |

F, female; M, male; ref, references.