

## CASE REPORT

# Enteric Fever Complicated with Acute Pancreatitis and Septic Shock

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### ABSTRACT

**Context** The most common causes of acute pancreatitis are alcohol and biliary stones. Salmonella infections can rarely cause acute pancreatitis. **Case report** We presents the case of a 24-year old female patient who presented to our hospital with abdominal pain radiating to the back, nausea, vomiting and blurred consciousness. She was diagnosed with acute pancreatitis and septic shock caused by Salmonella infection. **Conclusion** Increased amylase and lipase levels are common in Salmonella infections. However, acute pancreatitis is quite rare. Salmonella infections have a wide spectrum of presentation from self-limiting illness to life threatening severe pancreatitis and systemic disease.

### INTRODUCTION

Although acute pancreatitis (AP) incidence varies between communities, it was reported to be about 38/100.000 person/years [1]. It has been estimated that in the United States there are 210,000 admissions for acute pancreatitis each year [2]. The pathophysiology of acute pancreatitis is generally considered in three phases. In the first phase, there is premature activation of trypsin within pancreatic acinar cells. In the second phase, there is intrapancreatic inflammation through a variety of mechanisms and pathways. In the third phase, there is extrapancreatic inflammation [3]. The severity of AP is highly variable with most of the patients recovering spontaneously in a short period of time with supportive treatment, and not uncommonly it may lead to death [4]. Eighty percent of patients have mild, self-limiting AP needing only brief hospitalization, while 20% of patients with severe AP may develop various complications [5]. Contrast-enhanced Computer Tomography (CT) scan is the best imaging technique to diagnose the severity of acute pancreatitis, to exclude conditions that masquerade as acute pancreatitis, and to identify complications of pancreatitis. Abdominal ultrasound is usually performed at the time of admission to assess for gallstones as the etiology [6].

Even though the most common causes of acute pancreatitis are biliary stones and alcohol, it can be caused rarely by Salmonella infections. Enteric fever can cause various gastrointestinal complications such as acute pancreatitis, intestinal hemorrhage and perforation, hepatic abscesses, hepatitis, splenic rupture and acute cholecystitis. However, presentation of Salmonella infections with acute pancreatitis is quite rare [7]. We present a case of enteric fever presenting with septic shock and acute pancreatitis in an immunocompetent patient with blood cultures positive for *Salmonella typhi*.

### CASE REPORT

A Twenty-four-year old female patient presented to our hospital with abdominal pain radiating to the back, nausea, vomiting and fever for 1 week. Her general condition deteriorated progressively in the few days before presentation and she started having blurred consciousness. He denied any change in bowel habits, colicky pain, bleeding manifestations, chest pain, sweating, palpitation, cough or hematemesis, giddiness, swelling of legs in past. The patient arrived from her village three weeks earlier. The patient did not report any chronic illnesses or use of any medications, alcohol or smoking. Family history was irrelevant. Physical examination revealed stupor, dry tongue, decreased turgor tonus, axillary temperature: 39.2°C, blood pressure: 70/40 mmHg, oxygen saturation: 85%, respiratory rate: 32, heart rate: 126/minute, epigastric tenderness, decreased respiratory sounds in the basal zones of the lungs. Laboratory results were as follows: leukocyte: 3.200 cells/mm<sup>3</sup> (4.600-10.200 cells/mm<sup>3</sup>), hemoglobin: 10.6 g /dL (14.1-17.5 g /dL), platelet: 83.000 cells/mm<sup>3</sup> (142.000-424.000 cells/mm<sup>3</sup>), glucose: 193 mg /dL (70-105 mg /dL), urea: 91 mg /dL (19-44 mg

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/dL), creatinine: 1.66 mg /dL (0.7-1.2 mg /dL), sodium: 139 mmol/L (136-145 mmol/L), potassium: 3.7 mmol/L (3.5-5.1 mmol/L), calcium: 8.7 mg /dL (8.4-10.2 mg /dL), AST: 102 U/L (5-34 U/L), ALT: 73 U/L (0-55 U/L), LDH: 370 U/L (125-220 U/L), ALP: 184 U/L (40-150 U/L), GGT: 102 U/L (12-64 U/L), amylase:1473 U/L (25-125 U/L), lipase: 1540 U/L (8-78 U/L), total bilirubin: 0.9 mg /dL (0.2-1.2 mg /dL), direct bilirubin: 0.6 mg /dL (0-0.5 mg /dL), C-reactive protein: 31.9 mg /dL (0-0.5 mg /dL).

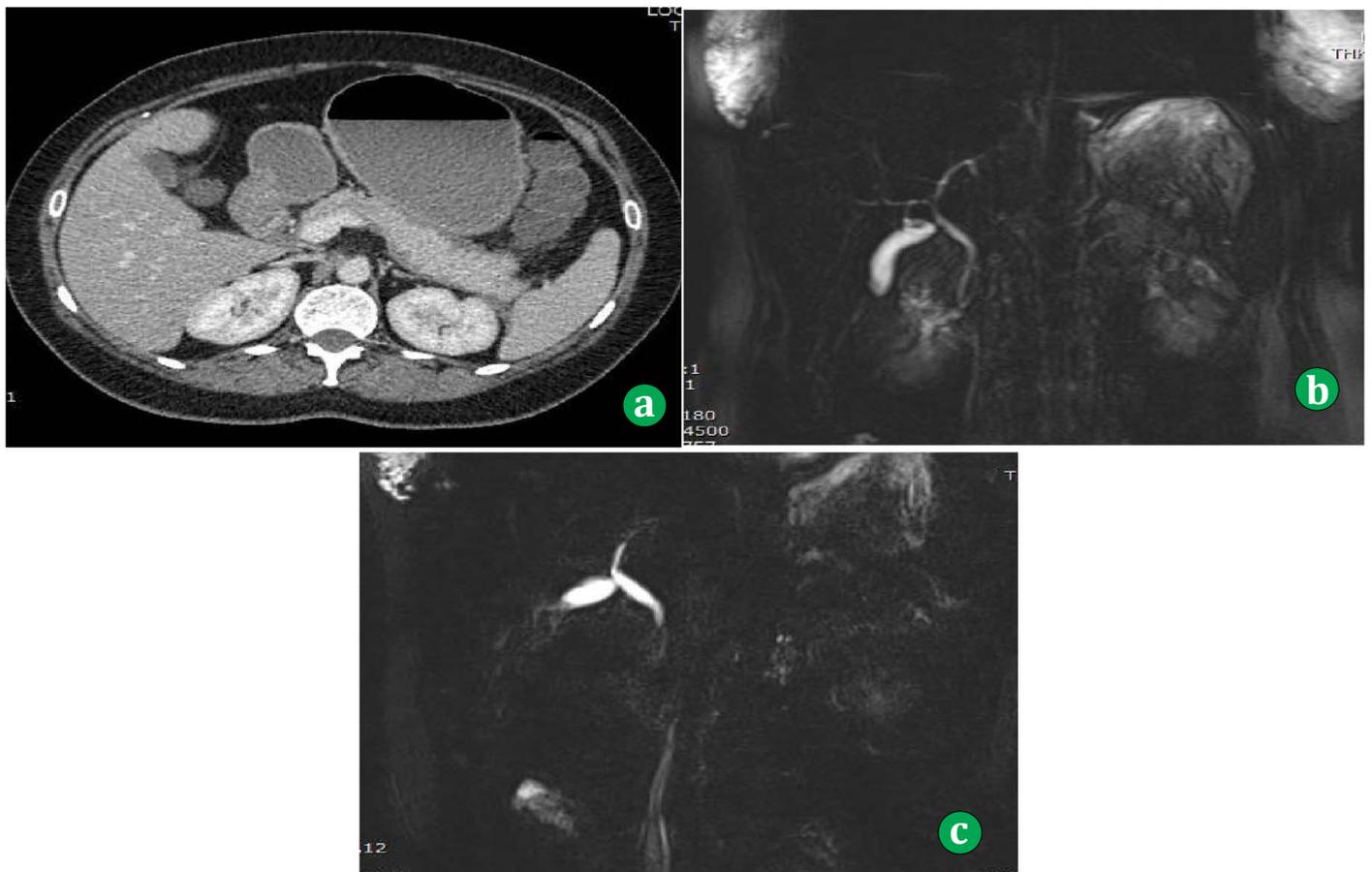
Further serological testing including for human immunodeficiency virus, hepatitis B virus, and hepatitis C virus were negative. Polymerase chain reaction (PCR) on blood sample for ebstein barr virus, cytomegalovirus, varicella zoster virus, herpes simplex virus type 1 and 2 were negative. The Gruber-Widal test was found positive with a titer of 1/320 and the blood cultures came back positive for *Salmonella typhi*. Chest X-ray revealed bilateral minimal pleural effusion. Abdominal CT showed images compatible with Stage D pancreatitis according to the Balthazar classification. The patient was admitted to the intensive care unit. She was started on intravenous fluids and third generation cephalosporins. The calcium and triglyceride levels were normal. The patient's history was negative for use of medications or exposure to toxic chemicals. Abdominal magnetic resonance imaging, magnetic resonance cholangiopancreatography and endoscopic ultrasonography detected no abnormalities of the biliary tree or any anatomical abnormality of the

pancreas (**Figures 1, 2**). The patient did not have any family history of pancreatitis and her Immunoglobulin G4 level was normal. The patient was diagnosed with acute pancreatitis and septic shock secondary to *Salmonella* infection. The patient was discharged on the fourteenth day of her hospitalization fully recovered.

## DISCUSSION

Even though many causes of acute pancreatitis were identified, the etiology of 78-85% of the cases may be found. 75-80% of AP cases are caused by biliary stones and alcohol, whereas bacteria, viruses and parasitic infestations are responsible for 10% of the cases [8, 9]. Some parasites, *Ascaris Lumbricoides* being the most common one, pass to the ampulla of Vater from duodenum and jejunum and cause obstruction of the pancreatic duct leading to AP [9]. Bacterial pathogens can cause pancreatitis via hematogenous and lymphatic dissemination or as an ascending infection from the small bowel. AP is mostly caused by *Mycoplasma Pneumonia* and less commonly by leptospirosis and tuberculosis. Rarely, *Salmonella typhi*, *Campylobacter jejuni*, *Yersinia Enterocolitica*, *Brucella*, *Legionella* and *Nocardia* can lead to acute pancreatitis [9]. After a case of pancreatitis caused by mumps was reported in 1817, viruses have been listed as a possible cause of AP [9].

*Salmonella* is a gram negative, facultative anaerobic bacillus with a high morbidity and mortality [10].



**Figure 1.** Diffuse enlargement of the pancreas, inflammatory changes in the peripancreatic fat, single, ill-defined fluid collection, (**a**). Computer tomography, Common bile duct, gall bladder and intrahepatic bile ducts are normal (**b,c**). Magnetic resonance cholangiopancreatography.

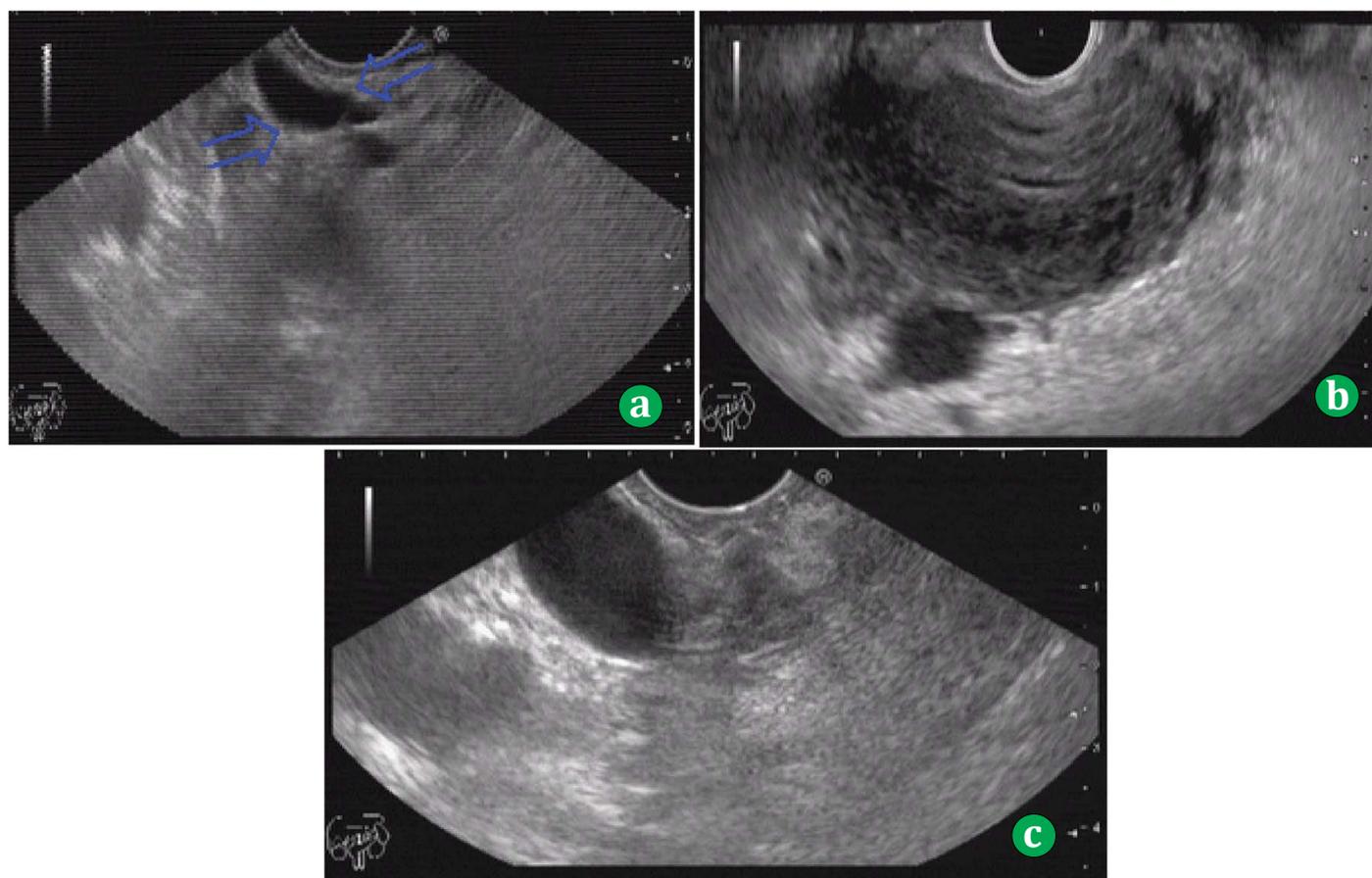


Figure 2. Normal bile duct (a). pancreatic parenchyma appearance heterogeneous and lobular (b). Normal gall bladder (c). Endoscopic ultrasonography.

Table 1. Characteristics of patients with definite acute pancreatitis associated with Salmonella enterica serovar typhi bacteremia.

Reference	Changes in Bowel Habits	Travel history	Serum Amylase-Lipase	Stage of Acute Pancreatitis	Complications	Result
Khan <i>et al.</i> [11]	No	Yes	1800-900 U/L	None	Renal failure, pancreatitis, rhabdomyolysis	Healthy discharged
Diwakar <i>et al.</i> [15]	No	No	112-54.8 U/L	Mild (Balthazar)	Acute pancreatitis	Healthy discharged
Chakrabarti <i>et al.</i> [16]	No	No	689-532 U/L	Severe (Balthazar)	Renal failure, pancreatitis, hepatitis	Healthy discharged
Blank <i>et al.</i> [17]	Yes	No	Normal	Severe (Ranson)	Acute pancreatitis	Healthy discharged
Hanaguchi <i>et al.</i> [18]	Yes	No	1444-4352 U/L	Mild (Balthazar)	Acute pancreatitis	Healthy discharged
Shankar <i>et al.</i> [19]	Yes	No	Significantly elevated	Severe (Balthazar)	Renal failure, pancreatitis, hepatitis, ARDS	Healthy discharged
Chi <i>et al.</i> [20]	No	No	260-467 U/L	Severe (Ranson)	Renal failure, pancreatitis, ARDS, shock	Died
Garg <i>et al.</i> [21]	No	No	375-None U/L	None	Acute pancreatitis and abscess	Healthy discharged
Singh <i>et al.</i> [22]	No	No	2200-800 U/L	Moderate (Balthazar)	Acute pancreatitis	Healthy discharged
Kayar <i>et al.</i> (Present case)	No	Yes	1473-1540 U/L	Moderate (Balthazar)	Renal failure, pancreatitis, ARDS, shock	Died

Salmonella has a wide range of presentations from self-limited gastroenteritis to typhoid fever. Non-typhoidal Salmonella types such a *Salmonella typhimurium* can cause inflammatory enterocolitis and invasive bacteremia, which can be fatal for the patient.

Similarly, Typhoidal Salmonella types such as *Salmonella typhi* can penetrate through the intestinal barrier and disseminate outside the intestines from the

liver or spleen and can cause a systemic infection, which may lead to septic shock and death [10].

Few cases of acute pancreatitis caused by salmonella infection were reported. These cases presented with a wide spectrum of presentations ranging from mild abnormalities to pancreatic abscesses requiring surgical treatment [11]. In most cases of salmonella enteritis, pancreatitis is also present biochemically, as indicated by

the increased amylase and lipase levels without causing any clinical signs or symptoms. Renner *et al.* reported that amylase and lipase levels are increased in 62% of the cases of Salmonella enteritis (29 out of 49 patients), whereas studies conducted by Baert *et al.* reported this in only 23% of their cases (7 out of 31 patients) [12, 13]. On the other hand, Pezzili *et al.* detected hyperamylasemia in 6.7% and hiperlipasemia in 16.7% of patients with Salmonella infection. None of the patients included in these studies was diagnosed with pancreatitis clinically, biochemically or radiologically [14]. Rare cases of pancreatitis and pancreatitis related complications caused by Salmonella infections have been reported [11, 15, 16, 17, 18, 19, 20, 21, 22]. **Table 1** details characteristics of some reported cases of AP associated with culture-proven typhoid fever.

The mechanism of development of pancreatitis in enteric fever is not well understood. It is thought that the bacteria can cause pancreatitis via hematogenous or lymphatic spreading or by direct penetration of the pancreas via migration to the pancreatic duct from the duodenum and biliary tree. Invasion of the pancreas is facilitated by predisposing factors that cause biliary stasis. The mechanism may also be toxin induced or immune mediated pancreatitis [23, 24].

## CONCLUSION

Salmonella infections have a wide spectrum of presentations, from self-limiting illness to life threatening severe pancreatitis and systemic disease. Hydration and treatment with effective antibiotics can be life-saving, especially in cases similar this patient who presented with acute pancreatitis and septic shock caused by Salmonella infection. As a conclusion, in cases presenting with deterioration of the general condition and acute pancreatitis of unknown etiology, Salmonella infection should be considered in the differential diagnosis, especially in patients with known predisposing factors.

## Conflict of Interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

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