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CASE IN POINT

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Salmonella Outbreak at a County Jail: Case Report and Discussion

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A 39-year-old man presented to our hospital from a local county jail with a 5-day history of diarrhea and vomiting associated with abdominal pain. The patient, who had a history of peptic ulcer disease, had been having 5 to 6 daily episodes of predominantly watery diarrhea that was not foul-smelling. He had noted occasional blood in the stool. The patient also reported subjective fevers and chills.

History. The review of systems was negative for melena, pyrosis, dizziness, or genitourinary tract symptoms. The patient was not noted to have objective weight loss. He denied any relieving factors, antibiotic use in the past 90 days, international travel, and zoonotic exposures.

The man's social history revealed that he was a current smoker who had smoked a half pack per day for 20 years, and that he consumed 2 alcoholic beverages per day before incarceration. He denied illicit drug use. His medication included omeprazole, 20 mg, 1 tablet daily. He reported no contributory surgical history. His family history was significant for a father who had coronary artery disease in his

70s.

Physical examination. Vital signs included a temperature of 36.8°C, a pulse rate of 89 beats/min, a respiratory rate of 18 breaths/min, and a blood pressure of 139/96 mm Hg. Physical examination revealed a well-developed man in mild distress due to abdominal pain. His neck was supple with no cervical lymphadenopathy. Examination findings of the oral cavity, heart, lungs, skin, extremities, and neurologic function were normal. The lungs were clear to auscultation. The abdominal examination revealed positive bowel sounds, normal pitch, soft, with diffuse tenderness and some guarding. No rebound was appreciated.

The patient was admitted to the hospital for further diagnostic workup for intractable diarrhea. An infectious disease consult was requested at the time of admission.

Diagnostic tests. The results of initial laboratory tests, including a complete blood cell count and a comprehensive metabolic panel, were unremarkable. The amylase level was elevated at 181 U/L (reference range, 30-110 U/L), and the lipase level was elevated at 115 U/L (reference range, 13-60 U/L).

Urinalysis revealed trace blood, negative leukocyte esterase and nitrates, small bilirubin, a white blood cell count of 0 to 2, and moderate bacteria. A computed tomography (CT) scan of the abdomen and pelvis with oral and intravenous contrast showed no acute intra-abdominal changes, and the pancreas was normal in appearance.

Hospital course. Stool studies were drawn and sent to the laboratory for analysis. Blood cultures were drawn before starting intravenous ceftriaxone, 2 g daily for 5 days. The patient also was given intravenous fluids.

An infectious diseases specialist recommended follow-up of stool cultures and continuation of care. Due to the patient's mildly elevated lipase and amylase levels and the absence of CT scan findings, abdominal ultrasonography was ordered, the results of which revealed mild peripancreatic fluid accumulation. At this point, a gastroenterologist was consulted who theorized that the elevated lipase and amylase levels were possibly secondary to gastroenteritis vs very mild pancreatitis and recommended advancing the patient's clear liquid diet to a bland diet.

The patient developed mild thrombocytosis, likely reactive in nature. He was afebrile during most of his hospital stay, and his vital signs remained stable and unremarkable. The patient's stool cultures revealed *Salmonella*, and the final diagnoses were *Salmonella* enterocolitis with elevated amylase and lipase, possible mild acute pancreatitis, and thrombocytosis, likely reactive in nature.

The patient was discharged back to the jail on oral omeprazole, 20 mg, 1 tablet daily, and oral sucralfate, 10 mL 4 times daily, with the plan to repeat a complete blood cell count and amylase and lipase levels in 2 to 3 weeks.

Discussion. In the United States, 31 major pathogens cause 9.4 million episodes of foodborne illness that lead to 55,691 hospitalizations and 1351 deaths annually.[1] Approximately 1.2 million illnesses with 23,000 hospitalizations and 450 deaths occur due to nontyphoidal *Salmonella* annually.[2] While norovirus caused the most foodborne illnesses, nontyphoidal *Salmonella* species caused the most hospitalizations (35%) and deaths (28%).[1] Although more than 2500 serotypes of *Salmonella* have been identified, fewer than 100 account for human infections, with *Salmonella* ser Typhimurium and *Salmonella* ser Enteritidis are the most common.[2] Note that the typhoid vaccines do not cover nontyphoidal species of *Salmonella*.

Poultry is often implicated as the source of common *Salmonella* outbreaks. According to the Foodborne Diseases Active Surveillance Network, 1114 food-related outbreaks occurred from 1998 to 2012, of which poultry accounted for the highest number of outbreaks (279, or 25%), illnesses, and hospitalizations, as well as the second highest number of deaths.[3] *Salmonella enterica* (43%) was the most common confirmed pathogen in the outbreaks.[3] Food-handling errors (64%) were the most common factor contributing to poultry-associated outbreaks, followed by inadequate cooking (53%).[3]

The results of one study of foodborne disease outbreaks in US correctional facilities showed that incarcerated persons experienced more than 6 times more outbreak-associated foodborne illnesses per population than did nonincarcerated persons.[4] From 1998 to 2014, 200 foodborne disease outbreaks resulted in 20,625 illnesses, 204 hospitalizations, and 5 deaths; all 5 deaths resulted from 2 *Salmonella* outbreaks.[4] *Clostridium perfringens* caused the most outbreaks (28%), followed by *Salmonella* (27%) and norovirus (16%).[4] Of the reported contributing factors, leaving food to remain at room temperature or warm outdoor temperature for several hours (37%), handling by an infected person or carrier (26%), and inadequate cleaning of processing or preparation equipment or utensils (24%) were the most commonly reported factors.[4]

Prior to the case discussed here, our hospital had seen multiple inmates from the same county jail who were admitted for similar symptoms and received a diagnosis of *Salmonella* enterocolitis. Exactly 21 inmates were culture-confirmed with *Salmonella* enteritis, and 72 probable cases were identified and reported to the state department of health and the Centers for Disease Control and Prevention during this outbreak, which lasted 1.5 weeks. After investigation by the health department, undercooked poultry was identified as the culprit.

In conclusion, *Salmonella* is a major cause of foodborne illness outbreaks in the general and incarcerated populations, with approximately 2 million inmates facing a 6-fold increased risk.[4] In order to prevent future outbreaks, the importance of proper food safety practices needs to be emphasized and enforced in the incarcerated and general population. The following 4 Food and Drug Administration Food Code provisions to prevent foodborne illnesses should be enforced[4]:

1. Requiring food service employees to wash their hands
2. Prohibiting bare-hand contact with ready-to-eat food
3. Excluding ill food service staff from working until at least 24 hours after symptoms such as vomiting and diarrhea have ended
4. Requiring at least 1 employee in a food service establishment to be a certified food protection manager

In the event of an infection, treatment should focus on fluid and electrolyte replacement. Antibiotic treatment is generally not recommended for immunocompetent individuals between 1 and 50 years of age who have mild to moderate symptoms.[5] Most cases are self-limited; however, in severe illness (high or persistent fever, a need for hospitalization, severe diarrhea of more than 9 or 10 stools per day, and immunocompromised patients), antibacterial treatment may be warranted.[6,7] The following antibiotics may be used: ciprofloxacin, 500 mg orally twice daily, or levofloxacin, 500 mg orally once daily; trimethoprim-sulfamethoxazole, 160 mg/800 mg orally twice daily; azithromycin, 500 mg once daily; ceftriaxone, 1 to 2 g intravenously once daily; or cefotaxime, 2 g intravenously every 8 hours.[6-9] A duration of therapy of 3 to 7 days is generally appropriate in immunocompetent individuals and 14 or more days in immunocompromised individuals.[6]

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