Salmonella Infection after Surgery of Small Intestine Foreign Bodies

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Key Words

Salmonella • *Salmonella choleraesuis* • *Salmonella enterica*
serotype choleraesuis • Small intestine

Abstract

Objective: To report the first case of *Salmonella enterica* serotype choleraesuis infection after surgery for small intestine foreign bodies. **Clinical Presentation and Intervention:** A 52-year-old woman presented to our hospital with the chief complaint of left abdominal pain for 1 day. The plain kidney-ureter-bladder film and abdominal computed tomography scan showed foreign bodies in the peritoneum. Metallic foreign bodies in the jejunum were found during surgery. Following surgery, the patient developed fever, and blood culture yielded *Salmonella enterica* serotype choleraesuis. The patient recovered smoothly after antibiotic therapy. **Conclusion:** *Salmonella enterica* serotype choleraesuis is a highly invasive serotype of nontyphoidal *Salmonella*. In addition to gastroenteritis, bacteremia, or extraintestinal localized infections, physicians should know that it could complicate intestinal surgery.

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Introduction

Nontyphoidal *Salmonella* species are major causes of foodborne infections, and can lead to self-limited acute gastroenteritis, bacteremia, or extraintestinally localized infections involving many organs. Young children and patients with certain underlying conditions, including acquired immunodeficiency syndrome, malignancies, hemolytic anemia, and inflammatory bowel disease, or those receiving immunosuppressive therapy, are at increased risk of *Salmonella* infections [1–3]. Among more than 2,000 nontyphoidal serotypes, *Salmonella enterica* serotype choleraesuis shows a much higher predilection for causing bacteremia and invasive extraintestinal infections in humans [1–3]. Postoperative infection with *Salmonella* has been reported in rare cases of orthopedic prostheses replacement surgery and intracranial surgery [4–6]. However, such an infection has never been reported resulting from intestinal surgery. Here, we report a patient who received surgery for foreign bodies in the small intestine that was subsequently complicated with an infection by *S. enterica* serotype choleraesuis. The purpose of this case report is to alert physicians to the fact that invasive salmonellosis could complicate surgery of the small intestine.

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Fig. 1. Plain kidney-ureter-bladder film showed 2 radiopaque materials over the left abdomen (arrow) and 2 calcified stones over the right upper quadrant (arrowhead).

Fig. 2. Abdominal CT scan showed metallic material at the small intestine (arrow).

Case Report

A 52-year-old woman presented to the Emergency Department, E-Da Hospital, a university-affiliated hospital in southern Taiwan, with the chief complaint consisting of abdominal pain on the left side for 1 day. She had no known systemic diseases and had been healthy until the day prior to admission. On arrival, she was clear and her vital signs were blood pressure: 146/70 mm Hg; pulse rate: 78 beats/min; respiratory rate: 20 breaths/min; and body temperature: 36.8°C. Physical examination revealed tenderness over the left paraumbilical region of the abdomen. Peritoneal signs with muscle guarding and rebounding pain were both disclosed when pressure was applied to the tender point of the abdomen. Her bowel sound decreased on auscultation. Laboratory findings revealed a red blood cell count of $4.52 \times 10^6/\text{mm}^3$, hemoglobin: 13.2 g/dl, hematocrit: 40.2%; white blood cell count: $8,970/\text{mm}^3$; platelets: $213,000/\text{mm}^3$; aspartate aminotransferase: 21 IU/l; creatinine: 0.9 mg/dl; sodium: 142 mmol/l; potassium: 3.8 mmol/l; blood sugar: 117 mg/dl; amylase: 34 U/l (normal range: 0–220 U/l); and lipase: 100 U/l (normal range: 0–190 U/l). A plain radiograph of abdomen showed 2 radiopaque materials over the left abdomen (fig. 1). The lateral view confirmed these 2 radiopaque materials were within the abdomen. An abdominal computed tomography (CT) scan was performed and revealed 2 linear metallic foreign bodies at the jejunum (fig. 2), but no free air in the peritoneum. Along with the foreign bodies, gallstones and bilateral ovarian cystic masses were also discovered in the CT

scan. The patient did not recall ingesting any metallic materials. Under the impression that this was an instance of jejunal foreign bodies with peritonitis, a laparotomy was performed and revealed 2 metallic foreign bodies which had penetrated the jejunum and been encased on the serosa of jejunum 100 cm from Treitz's ligament. The foreign bodies were removed, the serosa and jejunum debrided, and a primary suture of the jejunum performed. A large left ovarian hemorrhagic simple cyst with torsion was also found, and a left oophorectomy executed. A Jackson-Pratt drain tube was left in the cul-de-sac after the surgery.

The patient experienced a high fever, of up to 40°C, 4 days after surgery. Cefepime (Maxipime; Bristol-Myers Squibb) was given (2 g every 12 h intravenously) for the possible nosocomial infection after specimens for blood cultures were collected. Physical examination revealed discharge from the surgical wound and fascia deadhesion after removal of the sutures. A laparotomy was performed again to check for anastomotic leakage or wound infection. On direct inspection, there were no dirty ascites, pus, or anastomotic leakage, but there was a small amount of debris coating the serosa of the small intestine 390 cm from Treitz's ligament. Debridement of the debris and intraperitoneal irrigation with normal saline were performed. While culture of the debris was negative, the blood culture yielded *S. enterica* serotype choleraesuis. The stool culture was negative for *Salmonella*. The organism was susceptible to ampicillin, ceftriaxone, and trimethoprim/sulfamethoxazole, but resistant to chloramphenicol and ciprofloxacin when screened by disk diffusion. Intravenous ceftriaxone

(Rocephin; Roche) was prescribed (1 g every 12 h) and the fever subsided progressively with this treatment. The patient was discharged from the hospital 12 days after the second operation, and was in stable condition with negative follow-up blood cultures taken by the Outpatient Department.

Discussion

This is the first case report of *S. enterica* serotype choleraesuis infection after surgery for foreign bodies in the small intestine. *S. enterica* serotype choleraesuis is a host-adapted serotype that causes swine paratyphoid, and is also highly pathogenic to humans with septicemia and invasive extraintestinal manifestations [3, 7]. However, it is typically limited to swine (which serve as a carrier and reservoir), as well as facilities that have been contaminated [3].

Although this highly invasive serotype is infrequently isolated from human sources in the USA, Canada, and the UK, it is of particular concern in Taiwan [3, 8–10]. In the reports by Chiu et al. [3] and Chen et al. [11], serotype choleraesuis ranked the second most frequent isolate of *Salmonella* in Taiwan. A retrospective study conducted by Chen et al. [11] found that most adult patients with serotype choleraesuis bacteremia had obvious risk factors, including malignancy, liver cirrhosis, systemic lupus erythematosus, or previous use of corticosteroids [11]. Subsequent local infections with septic arthritis, pneumonia,

peritonitis, and cutaneous abscess were noticed in 21% of the bacteremic patients.

Postoperative infection with *Salmonella* is rarely encountered, and typically only reported in prosthetic replacement surgery and intracranial surgery [4–6]. Salmonellosis complicating a surgery for the removal of foreign bodies is very unusual.

Our patient, who came from southern Taiwan, an area endemic with *S. enterica* serotype choleraesuis, had been previously healthy with no symptoms or signs of *Salmonella* infection before this incident. Because the stool cultures were negative for *Salmonella*, there was no evidence showing our patient was a reservoir or carrier of *S. enterica* serotype choleraesuis. Although we cannot ascertain whether the source of *Salmonella* bacteremia was from the patient or the hospital, the source of the infecting pathogen was believed to be the result of the surgery, presumably from contaminated facilities or environment.

Conclusion

S. enterica serotype choleraesuis can cause bacteremia and various types of severe and potentially life-threatening focal infections. This infection could be complicated surgery, especially in some countries. Surgeons should beware of the possibility of *S. enterica* serotype choleraesuis bacteremia following intestinal surgery.

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