Mixed Tuberculosis and *Edwardsiella tarda* Infection of the Abdomen: A Case Report and Literature Review

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*Edwardsiella tarda* is an unusual pathogen rarely found in humans. A 54-year-old man who presented with diffuse abdominal pain, fever, chills, and hypotension received emergency operation. Cultures from the retroperitoneal abscess grew both *E. tarda* and *Escherichia coli*. Polymerase chain reaction testing of biopsy material from the granulomatous nodules of small bowel serosa was positive for *Mycobacterium tuberculosis*. This is a rare case of mixed infection of *E. tarda* and tuberculosis in a patient with an absence of predisposing factors.

**Key words:** abdominal tuberculosis, *Edwardsiella tarda*, retroperitoneal abscess

**Introduction**

*Edwardsiella tarda* is an unusual pathogen associated with freshwater ecosystems that is rarely found in humans. The majority of these infections occur in immunocompromised hosts. Risk factors for *E. tarda* infections include exposure to aquatic environments, preexisting liver disease, iron overload, and raw seafood ingestion. The clinical presentation is usually nonspecific, ranging from an asymptomatic carrier state to gastroenteritis, abscesses, enteric fever, and bacteremia. Fatal gastrointestinal and extraintestinal infections have been described.

**Case Report**

A 54-year-old man presented to our emergency department complaining of fever, chills, and diffuse abdominal pain for a few hours. For the previous two weeks, he had experienced abdominal discomfort, a poor appetite, and intermittent watery diarrhea, losing 7 to 8 kg. His past medical history was notable only for a three-year history of hypertension and an appendectomy 30 years ago. He drank alcohol occasionally on social occasions. He denied any recent travel, but had eaten raw fish one month previously.

On examination, his body temperature was 38.6°C, pulse 126, blood pressure 128/60 mm Hg and his respiratory rate was 20 per minute. His abdomen was soft with mild, diffuse tenderness. A chest film was unremarkable, while a plain abdominal x-ray showed focal ileus in the left lower quadrant. The white cell count was 9000/mm³ with 0% band forms and 82% segmented neutrophils. Six hours after arrival, he complained of severe abdominal pain and his blood pressure dropped to 81/48 mm Hg. Abdominal tenderness increased, and he developed rebound tenderness and muscle rigidity. Abdominal computed tomography showed a gas-forming abscess in the right lower quadrant with moderate ascites (Fig. 1). He was therefore immediately taken to surgery. The preoperative
diagnosis was diverticulosis with rupture and sepsis.

During the operation, 700cc of yellowish turbid ascites was drained. Numerous small granulomatous nodules, about 0.5 cm in diameter, noted on the small bowel serosa, mesentery, lymph nodes, liver surface, and visceral peritoneum were biopsied. The small bowel involved by these nodules was red, swollen, and coated with fibrin. A 6 × 5 × 5 cm retroperitoneal abscess near the cecum was opened, biopsied, irrigated, and drained. The postoperative diagnosis was probable tuberculous peritonitis. Carcinomatosis could not be ruled out clinically, although no mass was found in the peritoneum.

The patient was treated with cefazolin and gentamicin but had a fever spiking to 39°C on the second postoperative day, so the antibiotics were changed to ciprofloxacin, amikacin and metronidazole. Blood cultures did not grow any pathogen. Cytology examination of the ascitic fluid revealed no malignant cells, but multinucleated giant cells were seen. Polymerase chain reaction (PCR) on the fluid was negative for tuberculosis. On microscopic examination, biopsy specimens of nodules from the small bowel serosa and mesentery revealed chronic granulomatous inflammation with Langhan’s giant cells accompanied by focal necrosis and fibrosis in the soft tissue. Acid-fast, Giemsa, and periodic acid-Schiff stains of the specimens were negative for microorganisms. However, mycobacterial infection could not be excluded, and the tissue was sent for PCR using primers T4 and T5. (T4 primer sequence is 5’-CCT-GCG-AGC-GTA-GGC-GTC-GG-3’; T5 primer sequence is 5’-CTC-GTC-CAG-CGC-CGC-TTC-GG-3’.) This showed a distinct band consistent with the presence of mycobacteria. Biopsy specimens from the abscess showed only inflammation and fibrosis with no evidence of malignancy. Edwardsiella tarda was isolated from ascites. The abscess culture grew both E. tarda and Escherichia coli. Both organisms were susceptible in vitro to all antibiotics tested, including aminoglycosides, cephalosporins, β-lactams, and fluoroquinolones.

The patient became afebrile after the
antibiotics were changed, improved steadily, and was discharged on post-operative day 17 after completing a course of parenteral antibiotics. Anti-tuberculous drugs were given for the following year.

**Discussion**

Human infections caused by the bacterium *E. tarda* are rare\(^{(1)}\). In 1962, Edwardsiella were first distinguished in the family of Enterobacteriaceae by Trabulsi and Ewing and named in honor of the American bacteriologist P.R. Edwards. In 1969, the first series of human infections attributed to this bacterium was reported by Jordan and Hadley\(^{(2)}\). The members of the Edwardsiella genus are widely distributed in fresh and seawater and cause disease in reptiles, amphibians, and fish, such as emphysematous putrefactive disease in catfish\(^{(3)}\). *E. tarda* is probably part of the normal intestinal flora of water tortoises (*Clemmys caspica*); humans appear to be accidental hosts.

Edwardsiella species are oxidase-negative, catalase-positive, Gram-negative bacilli. *E. tarda* has been implicated in a variety of human illnesses, including gastroenteritis, wound infections, septicemia, and other infections in sites that are normally anatomically sterile. The most frequently manifestation of *E. tarda* infection reported in humans is gastrointestinal disease, particularly in tropical and subtropical countries where dietary habits include raw fish\(^{(4)}\). Patients commonly present with intermittent watery diarrhea and a low-grade fever (38.0 to 38.5°C). Symptoms similar to typhoid fever\(^{(5)}\) and shigella-like secretory dysentery\(^{(2)}\) have also been reported. These illnesses are mostly self-limited and usually resolve spontaneously without antibiotics\(^{(2)}\).

*E. tarda* has also been recovered from wound infections ranging from mild cellulitis to necrotic gangrene\(^{(1,2,6)}\). Reported cases usually occur in aquatic environments, associated with laceration or penetrating injury, or occasionally after contact with exotic animals. The organism has also been reported in association with urinary tract infection, tubo-ovarian abscess\(^{(7)}\), osteomyelitis, endocarditis, pyomyoma\(^{(8)}\), infected vascular prostheses\(^{(9,10)}\), liver abscess, cholangitis, and neonatal meningitis\(^{(11)}\).

*E. tarda* tends to be present in mixed infections with other microorganisms, not only in gastroenteritis, but also in intra-abdominal, perirectal, subgaleal and wound abscesses. A study from Taiwan reported that 16 of 22 *E. tarda* isolates were from mixed cultures, most commonly with *E. coli*\(^{(2)}\). Our patient’s abscess involved both organisms. Recent investigations have not been able to determine if *E. coli* provides better conditions for *E. tarda* growth.

In the presence of iron, *E. tarda* is capable of producing β-hemolysin, which explains the propensity of the organism to cause serious infection in patients with hemolysis or iron overloading, including conditions such as liver cirrhosis, hepatoma, alcoholic liver disease, sickle cell anemia, leukemia, and in neonates. Iron availability apparently controls the expression of certain virulence factors associated with Edwardsiellae\(^{(2)}\). Cultures of *E. tarda* in the laboratory have demonstrated that virulence factors are produced more readily at 25°C than at 37°C\(^{(15)}\).

Our patient had no obvious predisposing factors for an *E. tarda* infection other than ingestion of raw fish a month before. We speculate that the concurrent abdominal tuberculosis may have provided a suitable environment for *E. tarda* mixed infection. The two-week history of vague symptoms preceding his admission to our hospital could in theory be attributed to either infection, although we think it most likely the tuberculosis was responsible for the insidious nature of his complaints.

Abdominal tuberculosis may mimic many conditions, including inflammatory bowel disease, malignancy and other infectious diseases\(^{(13)}\). Pulmonary disease is evident in only 15% of patients with abdominal tuberculosis\(^{(14)}\).
The infection is often difficult to diagnose preoperatively because patients may not recall exposure history. Clinical findings and even abdominal CT results are non-specific. In this case, the presence of an E. tarda and E. coli mixed infectious abscess further confused the picture. The diagnosis of tuberculosis was not suspected until surgery, and PCR of a biopsy specimen was required for confirmation.

**Conclusion**

Our case raises the interesting possibility that abdominal tuberculosis may have predisposed the patient to infection with E. tarda in some way. Even without tuberculosis, an abscess containing E. tarda and E. coli would, at some point, have declared its presence. In contrast to the self-limited nature of some infections with E. tarda, this serious, overt tuberculosis infection made isolation and identification of a rare organism relatively straightforward, suggesting that the actual incidence of E. tarda infections is most likely underestimated.

**References**

腹內結核及*Edwardsiella tarda*菌混合感染：
病例報告及文獻回顧

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*Edwardsiella tarda*為不常見的致病菌。五十四歲的男性病患，因腹部腹痛、發燒畏寒、血壓降低接受急診手術。後腹腔濃縮培養出*E. tarda*及*E. coli*，小腸表面的結節證實為結核菌感染。該患者為少數無危險因子存在但有腹內結核菌及*E. tarda*混合感染病例。

關鍵詞：腹內結核，*Edwardsiella tarda*，後腹膜膿瘍