

Case report

## Infected subdural hematoma caused by *Edwardsiella tarda*

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### Abstract

**Objective:** Both infected subdural hematoma (ISH) and *Edwardsiella tarda* infections are rare in humans. *E. tarda* is a motile, facultative anaerobic, gram-negative rod bacterium, which is isolated from fresh or brackish water, but not usually from humans. Extra-intestinal *E. tarda* infections are rare and might cause severe clinical symptoms. However, ISH caused by *E. tarda* has not been reported previously. We report the first case of ISH due to *E. tarda*.

**Patient:** A 76-year-old man was admitted to our hospital with a headache, loss of appetite, and nausea. Computed tomography revealed bilateral subdural hematoma.

**Results:** We performed burr hole drainage. A hematoma with pus was found on the left side and chronic hematoma was found on the right side. Consequently, we diagnosed him with ISH on the left side and chronic subdural hematoma on the right side. *E. tarda* was detected in a culture from the hematoma with pus on the left side. As postoperative antibiotic therapy, we administered ceftriaxone and metronidazole for 47 days. The patient was discharged with no residual neurological deficit.

**Conclusion:** Our case implied that favorable outcomes can be obtained by drainage and appropriate antibiotic therapy for ISH caused by *E. tarda*.

**Key words:** Infected subdural hematoma, subdural empyema, chronic subdural hematoma, *Edwardsiella tarda*

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### Introduction

Reports on both infected subdural hematoma (ISH) and *Edwardsiella tarda* infection in humans are rare. *E. tarda*

is a motile, facultative anaerobic, gram-negative rod bacterium. It is not a resident bacterium in humans. Thus, it is rare that *E. tarda* is isolated from humans, as opposed to fresh or brackish water environments. *E. tarda* rarely causes extra-intestinal infections, which might cause severe clinical outcomes in humans. In bacteremia with liver cirrhosis, the mortality is high<sup>1)</sup>. In contrast, ISH due to *E. tarda* is unknown to our knowledge. We report our case because favorable outcomes were obtained by burr hole drainage and antibiotic therapy.

### Patient

A 76-year-old man presented with only a headache. He had a previous history of common bile duct stones (CBDSts). The travel and dietary history of the patient was unremarkable. He was alert and had no abnormal neurological findings. Computed tomography (CT) revealed thin bilateral chronic subdural hematoma (CSDH) (Figure 1A). He underwent follow-up throughout the clinical course. His headache developed gradually, and worsened to include loss of appetite and nausea. He was admitted to our hospital 20 days after the first visit. He was disoriented (Glasgow Coma Scale score, 14), had right hemiparesis (manual muscle testing score=4), and had a body temperature of 36.2°C. His white blood cell count was 11800/mm<sup>3</sup> and serum C-reactive protein levels were 18.92 mg/dL on admission. Follow-up CT revealed that the left subdural effusion had increased slightly (Figure 1B). The follow-up pre-operative diagnosis was progressing CSDH because there were few indications of infection, although the laboratory data indicated elevated inflammation markers. Pre-operative magnetic resonance imaging was not performed because pre-operative diagnosis and indications for surgical treatment were determined based on neurological signs and CT findings. Therefore, we performed burr hole drainage and found hematoma with pus on the left side (Figure 2) and chronic hematoma on the right side. Consequently, he was diagnosed with ISH on the left side and CSDH on the right side. *E. tarda* was detected in a

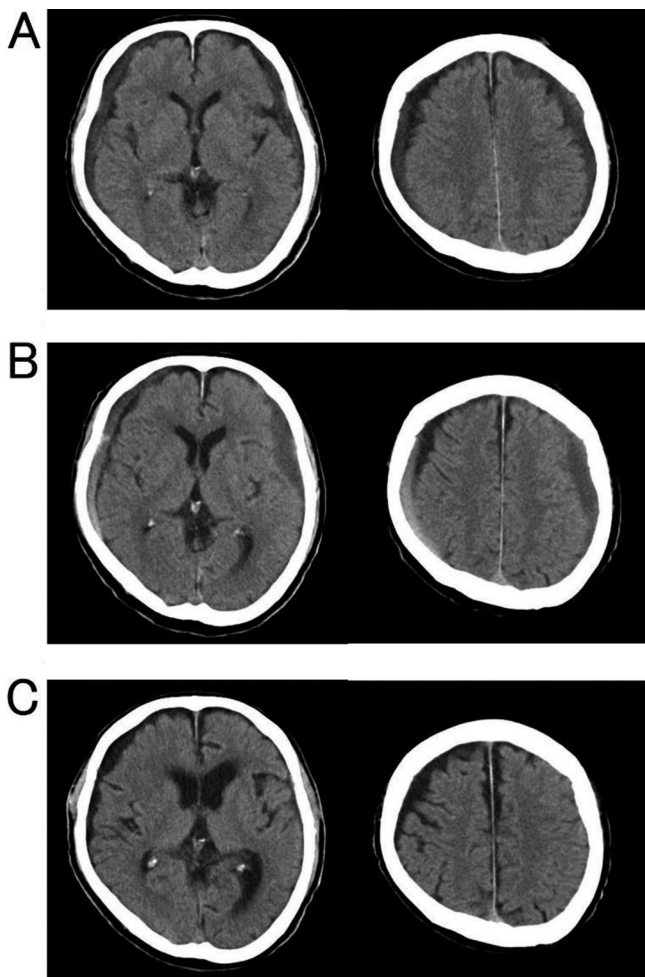
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**Figure 1** Computed tomography at the first visit (A), admission (B), and 37 days after operation (C). (A) Bilateral chronic subdural hematoma. (B) The left subdural hematoma increased slightly. (C) The left infected subdural hematoma and right chronic subdural hematoma almost disappeared.

culture of the hematoma with pus using a MicroScan Walk-Away 40 Plus instrument with the Neg Combo EN 1J panel (Beckman Coulter K.K., Tokyo, Japan). No significant findings were detected in the cultures from the hematoma on the right side or from blood. The detected *E. tarda* was susceptible to most antibiotics. As postoperative antibiotic therapy, we administered ceftriaxone (4 g/day in two divided doses) and metronidazole (1.5 g/day in three divided doses) for 47 days.

The patient experienced abdominal pain 23 days after admission and was diagnosed with CBDS. A gastroenterologist in our hospital performed endoscopic retrograde cholangiopancreatography. Simultaneously, bile was collected and cultured. However, *E. tarda* was not detected.



**Figure 2** Hematoma with pus evacuated from the left subdural space.

The patient's abdominal pain disappeared following CBDS treatment.

The postoperative course went well after antibiotic therapy. CT revealed that the left ISH and right CSDH almost disappeared 37 days after operation (Figure 1C). The patient became ambulatory and was discharged with no residual neurological deficit.

## Discussion

Gastroenteritis is caused by *E. tarda*, which is isolated from stool samples, after consuming freshwater fish or eels. In contrast, extra-intestinal infections with *E. tarda*, such as liver abscess, biliary tract infection, bacteremia, skin and soft tissue infection, tubo-ovarian abscess, and meningitis, are rare. In particular, patients with *E. tarda* infection are more likely to have a history of underlying hepatobiliary disease or an immunocompromised host, and the mortality of patients with *E. tarda* bacteremia with liver cirrhosis is high<sup>1,2</sup>. In our case, the patient with ISH due to *E. tarda* also had CBDS as a disease of the hepatobiliary system, consistent with previous reports<sup>1,2</sup>. To our knowledge, five reports have been published previously detailing intracranial *E. tarda* infection: four cases of meningitis<sup>3-6</sup> and one case of multiple brain abscess<sup>7</sup>. Three of the four patients with *E. tarda* meningitis died early after onset, whereas the fourth had a good recovery. The patient with *E. tarda* brain abscess also had a good recovery (Table 1).

Only 47 cases of ISH have been reported in the literature<sup>8</sup>. In our case, the infectious routes for ISH are unclear because neither the existence of infectious sites except for ISH nor the detection of the pathogen in blood cultures were found. However, we suspect that *E. tarda* infected the mem-

**Table 1** Summary of six cases of intracranial *Edwardsiella tarda* infection

Author, Year	Age	Sex	Disorder	Treatment	Outcome
Sonnenwirth <i>et al.</i> , 1968 <sup>3)</sup>	31-year-old	F	meningitis	–	D
Okubadejo <i>et al.</i> , 1968 <sup>4)</sup>	neonate	F	meningitis	antibiotics (CP, PC, SM, sulphadiazine)	D
Sachs JM <i>et al.</i> , 1974 <sup>5)</sup>	17-year-old	M	meningitis	antibiotics (ABPC)	GR
Vohra <i>et al.</i> , 1988 <sup>6)</sup>	neonate	F	meningitis	antibiotics (GM, PC)	D
Takeuchi <i>et al.</i> , 2009 <sup>7)</sup>	neonate	F	brain abscess	drainage, V-P shunt, antibiotics (ABPC, CTX, MEPM)	GR
Our case, 2017	76-year-old	M	infected subdural hematoma	burr hole drainage, antibiotics (CTRX, MNZ)	GR

ABPC: ampicillin, CP: chloramphenicol, CTX: cefotaxime, CTRX: ceftriaxone, D: dead, F: female, GM: gentamicin, GR: good recovery, M: male, MEPM: meropenem, MNZ: metronidazole, PC: penicillin, SM: streptomycin, V-P shunt: ventriculoperitoneal shunt.

brane of CSDH hematogenously based on the following reasons. First, both left ISH and right CSDH existed concurrently. Second, the left subdural effusion observed using CT changed with time. Finally, the patient had no history of open head injury or local extensions from paranasal sinusitis or otitis. It is also unclear how *E. tarda* entered the patient's body because he denied eating suspicious food or contacting any *E. tarda* habitat environments before his admission.

No established procedure for ISH treatment exists because of the rarity of the disease, various conditions of patients with ISH, and differential pathogens in each case. However, operation for the drainage and administration of appropriate antibiotics are commonly selected treatments for ISH. The selection of burr holes or craniotomy as the surgical treatment remains controversial. Otsuka *et al.*<sup>9)</sup> reported no significant difference between burr hole and craniotomy for ISH outcomes. In contrast, Dabdoub *et al.*<sup>8)</sup> reported that craniotomy should be the initial method for surgical drainage because recurrence rates in the burr hole surgery group were higher than those in the craniotomy group in adults. However, we think that the choice of craniotomy for ISH is not always ideal because surgical treatment depends on patient characteristics.

## Conclusion

Our case implied that favorable outcomes can be obtained from one-time burr hole surgery and appropriate antibiotic therapy for ISH due to *E. tarda*, although extraintestinal *E. tarda* infections might cause severe clinical symptoms.

**Conflicts of Interest:** All authors report no conflicts of interest concerning this article.

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