

# First report of biliary tract infection caused by multidrug-resistant *Serratia fonticola*

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## Abstract

*Serratia fonticola* is widely distributed in nature and a rare human pathogen. We report the first Case of biliary tract infection due to multidrug-resistant *Serratia fonticola* in a 78-year-old woman in Vietnam. Bile culture grew *S. fonticola*. Based on the antibiogram, *S. fonticola* is resistant to all antibiotic classes. The patient developed septic shock and died.

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**Keywords:** Biliary tract infection, emerging pathogen, multidrug resistance, septic shock, *Serratia fonticola*

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## Case report

A 78-year-old woman with a 2-month history of cholangiocarcinoma and percutaneous transhepatic biliary drainage was admitted to the Department of Gastroenterology of 108 Military Central Hospital in Vietnam with biliary sepsis. Ten days before admission, her drainage catheter had slipped out of the bile duct. She reported subjective fever, nausea and malaise

for a few days. On admission, her temperature was 38.5°C, heart rate 97 beats/minute, blood pressure 128/76 mmHg, respiratory rate 22 breaths/minute and oxygen saturation 94% in room air.

On physical examination, she was drowsy but oriented to person, place, time and situation. Her abdomen was tender and she experienced pain in the right upper quadrant. The bile fluid drained out itself through the drainage site. Another systemic examination was normal.

Laboratory tests revealed white blood cell count  $10.4 \times 10^6/L$  with 58.5% neutrophils, platelets  $456 \times 10^9/L$ , alanine aminotransferase 88 U/L, aspartate aminotransferase 42 U/L,  $\gamma$ -glutamyl transpeptidase 392 U/L, total bilirubin 48.6  $\mu\text{mol/L}$  and procalcitonin 1.4 ng/mL. Abdominal ultrasound and computed tomography showed a common bile duct and intrahepatic ductal dilatation. Two bottles for blood and bile cultures were sent to the bacteriology laboratory. Empiric treatment started with intravenous cefoperazone-sulbactam (6 g/day) and amikacin (15 mg/kg/day) for 8 days.

On the 8th day, the general condition of the patient deteriorated with the manifestation of drowsiness and shortness of breath. Vital signs showed heart rate of 130 beats/minute, blood pressure of 80/40 mmHg maintained with an infusion of noradrenaline 0.25  $\mu\text{g/kg/minute}$ , respiratory rate 35 breaths/minute and oxygen saturation 87% with an oxygen flow of 15 L/minute through a reservoir bag mask.

The blood results were as follows: leucocyte count  $27 \times 10^6/L$ , prothrombin 20%, fibrinogen 4.47 g/L, total bilirubin 90.2  $\mu\text{mol/L}$ , procalcitonin 75.2 ng/mL and lactate 4 mmol/L. Bile culture was positive for *Serratia fonticola*, and blood cultures were negative. Species identification was performed by Vitek MS (bioMérieux, Marcy l'Étoile, France). Tracheal intubation, fluid infusion and vasopressor therapy were performed. The antibiotics were switched to intravenous doripenem 1.5 g/day and levofloxacin 750 mg/day. Subsequently, the antibiogram showed resistance to all antibiotic classes (Table 1). The woman's condition worsened rapidly and she died on the 10th day.

## Discussion

*Serratia fonticola* is a member of the *Enterobacteriaceae* family, which was first identified in 1979 from drinking water and soil [1]. This bacteria can survive in different environments with a minimum growth temperature of 2°C [2]. The genus *Serratia* contains nine species, of which *S. fonticola* is commonly found in animals and rarely causes disease in humans. *Serratia fonticola* is known to be related to contaminants in the respiratory tract

**TABLE 1. Antimicrobial susceptibilities of a *Serratia fonticola* isolate obtained from a 78-year-old woman**

| Antibiotic                    | MIC (mg/L) | Interpretation |
|-------------------------------|------------|----------------|
| Ticarcillin                   | >128       | Resistance     |
| Ticarcillin/clavulanic acid   | >128       | Resistance     |
| Piperacillin                  | >128       | Resistance     |
| Piperacillin/tozobactam       | >128       | Resistance     |
| Ceftazidime                   | >64        | Resistance     |
| Cefepime                      | >64        | Resistance     |
| Aztreonam                     | 16         | Resistance     |
| Imipenem                      | 8          | Resistance     |
| Meropenem                     | >16        | Resistance     |
| Amikacin                      | >64        | Resistance     |
| Gentamicin                    | >16        | Resistance     |
| Tobramycin                    | >16        | Resistance     |
| Levofloxacin                  | >8         | Resistance     |
| Ciprofloxacin                 | >4         | Resistance     |
| Trimethoprim/sulfamethoxazole | >320       | Resistance     |

and has been isolated in the droppings of wild birds [3] as well as from crocodile skin wounds [4].

*Serratia fonticola* was recognized as a human pathogen for the first time in a wound sustained in a traffic accident [5]. Since then, *S. fonticola* has been isolated from infections of skin and soft-tissue [6] and the urinary tract [7], and from septicemia [5]. To the best of our knowledge, this is the first report of *S. fonticola* biliary tract infection in humans.

*Serratia fonticola* has the potential to harbour resistance factors, including an inducible chromosomal  $\beta$ -lactamase and inducible FONA-type extended-spectrum  $\beta$ -lactamase [8]. It can transmit antimicrobial-resistant factors to other bacteria. Based on previous reports, *S. fonticola* remains susceptible to extended-spectrum cephalosporins, fluoroquinolone and carbapenem [7]. However, *S. fonticola* from our clinical specimen was resistant to all groups of antibiotics. Biliary tract infections

caused by multidrug-resistant *S. fonticola* may be related to the hospital environment.

*Serratia fonticola* may be an unusual emerging pathogen of biliary tract infection in humans.

## Conflict of interest

All authors declare that they have no conflicts of interest.

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