Comamonas kerstersii bacteremia in a patient with acute perforated appendicitis
A rare case report
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Abstract
Rationale: Comamonas species are rarely associated with human infections. Recent reports found that Comamonas kerstersii was associated with severe diseases such as abdominal infection and bacteremia. However, C. kerstersii maybe be confused with Comamonas testosteroni using the automatic bacterial identification systems currently available.

Patient concerns: A 31-year-old man who had onset of left upper abdominal pain developed clinical manifestations of right lower abdominal pain and classic migration of pain at the temperature of 39°C. The positive strain of aerobic and anaerobic bottles of blood cultures was identified.

Diagnoses: The patient was diagnosed as acute peritonitis and perforated appendix with abdominal abscess.

Interventions: The bacterium was identified by routine methods, MALDI-TOF-MS and PCR amplification of the 16S rRNA. The patient was treated with exploratory laparotomy, appendectomy, tube drainage, and prescribing antibiotic treatment.

Outcomes: The patients were discharged with complete recovery. The organisms were confirmed as C. kerstersii by MALDI-TOF-MS and a combination of the other results.

Lessons: Our findings suggest that C. kerstersii infection occurs most often in association with perforated appendix and bacteremia. We presume that C. kerstersii is an opportunistic pathogen or commensal with the digestive tract and appendix bacteria.

Abbreviations: C. kerstersii = Comamonas kerstersii, MALDI-TOF-MS = matrix-assisted laser desorption ionization–time of flight mass spectrometry, MIC = minimum inhibitory concentration, PCR = polymerase chain reaction.

Keywords: bacteremia, Comamonas kerstersii, perforated appendicitis

1. Introduction
The genus Comamonas was originally created in 1985, and it included a single species, Comamonas terrigena (C. terrigena).\cite{1} In 1987, Comamonas testosteroni and Comamonas acidovorans were reclassified as members of the Comamonas genus. C. acidovorans was subsequently reclassified as Delftia acidovorans on the basis of its 16S rRNA gene sequence in 1999.\cite{2} Comamonas kerstersii (C. kerstersii) was described as 1 of 3 genotypically separate groups of C. terrigena in 2003.\cite{3} Now, Comamonas genus contains 17 species including C. terrigena, C. aquatica, C. kerstersii, C. testosteroni, C. denitrificans, C. nitrativorans, C. koreensis and others. Comamonas species have a wide geographic distribution and are commonly found in soil, plants, animal, water saprophytes, and in humidifier reservoir water.\cite{4}

Comamonas species are rarely associated with human infections.\cite{5} However, in recent years, several publications have incriminated C. testosteroni and C. kerstersii in human diseases, including severe invasive infections, such as abdominal infection and bacteremia.\cite{6–10} However, C. kerstersii maybe be confused with C. testosteroni because of the difficulties in accurately identifying it using the automatic bacterial identification systems currently available. Some important biochemical tests, matrix-assisted laser desorption ionization–time of flight mass spectrometry (MALDI-TOF-MS) and gene sequencing by polymerase chain reaction (PCR) amplification of the 16S rRNA can confirm the specific Comamonas species. To the best of our knowledge, this is the first report of C. kerstersii bacteremia in a patient with acute perforated appendicitis.

2. Case presentation
A 31-year-old man presented to the emergency department of our hospital with onset of left upper abdominal pain followed by nausea and vomiting at a temperature of 37.5°C. His white blood
The collected data were divided on the basis of the patient's age, sex, and sites of infection, clinical diagnosis, antibiotic sensitivities, spectral score of MALDI-TOF-MS and reference.

Table 1
Clinical and microbiological characteristics of the 9 cases of C. kerstersii infections.

| Age (years) | Sex | Site of infection | Clinical diagnosis | Antibiotic sensitivities | Spectral score of MALDI-TOF-MS | Reference |
|-------------|-----|-------------------|--------------------|--------------------------|-------------------------------|-----------|
| 11, M       | Peritoneal fluid | perforated appendix | ND | ND | Opota 2014[18] |
| 65, M       | Blood           | diverticulosis     | R to T/S and CP | 2.26 | Opota 2014[18] |
| 43, F       | Peritoneal fluid | Sigmoid perforation by foreign body | S to all the antibiotics | 2.022 | Almuzara 2013[15] |
| 48, M       | Peritoneal fluid | Perforated appendix | S to all the antibiotics | 2.066 | Almuzara 2013[15] |
| 10, F       | Peritoneal fluid | Perforated gangrenous appendix | R to CP | 2.097 | Almuzara 2013[15] |
| 21, F       | Peritoneal fluid | Perforated appendix | S to all the antibiotics | 2.251 | Biswas 2014[19] |
| 9, M        | Peritoneal fluid | perforated appendix | R to CP | 2.275 | Biswas 2014[19] |
| 31, M       | Blood           | perforated appendix | R to CP, T/S and LX | 1.815 | Present case |

CP = ciprofloxacin, F = female, LVX = levofloxacin, M = male, ND = not determined, R = resistant, S = susceptible, T/S = trimethoprim/sulfamethoxazole.

The collected data are divided on the basis of the patient’s age, sex, and sites of infection, clinical diagnosis, antibiotic sensitivities, spectral score of MALDI-TOF-MS and reference.
clinical diagnosis of these patients is perforated appendix[7,9], followed by sigmoid perforation and diverticulosis, which demonstrates the association of C. kerstersii with severe diseases. Aside from the previously reported cases of C. testosteroni infections, Opota et al[13] reported the first C. kerstersii bloodstream infection in a patient with diverticulosis. The present case is the first report of C. kerstersii bacteremia in a patient with acute perforated appendicitis. C. testosteroni species infection has been associated with exposure to contaminated fish tank water or exploration of the abdominal cavity.[18] Thus, we presume that C. kerstersii is an opportunistic pathogen or commensal with the digestive tract and appendix bacteria.

4. Conclusion

In summary, C. kerstersii infection occurs most often in association with severe diseases, such as perforated appendix and bacteremia. This strain is always sensitive to a broad range of antibiotics. However, C. kerstersii is easily confused with C. testosteroni by automatic bacterial identification systems currently available on the market. Overall, MALDI-TOF-MS and gene sequencing are more accurate approaches to identify the species than others. Further research is required to clarify the origins of this organism.

Acknowledgments

We are grateful to all of the contributors of the departments of laboratory medicine in different hospitals for their identification of this strain. This work was supported by the Key Programs of Science and Technology Commission Foundation of Changning District, Shanghai (CNKW2016Z05) and the National Nature Science Foundation of China (No. 81401855).

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