

[CASE REPORT]

Three Weeks of Treatment Induced Long-term Remission in a Patient with *Micrococcus luteus*-related Peritonitis: A Case Report

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Abstract:

Micrococcus luteus can cause relapsing and refractory peritoneal dialysis infection because it leads to strong biofilm formation. A 69-year-old woman who had undergone peritoneal dialysis (PD) visited the emergency department complaining of cloudy peritoneal dialysate. She was initially given intraperitoneal cefazolin (1 g/day) and ceftazidime (1 g/day). *Micrococcus luteus* was detected in a culture test. Thus, ceftazidime was discontinued. She remained disease-free for 22 months until she developed PD-related peritonitis. We administered antibiotics for 21 days and thereafter identified 2 important clinical issues. *Micrococcus* species-related peritonitis can sometimes be cured without vancomycin. Furthermore, the provision of three weeks of sufficient treatment may be important.

Key words: *Micrococcus luteus*, *Micrococcus* species, peritonitis, peritoneal dialysis

(Intern Med Advance Publication)

(DOI: 10.2169/internalmedicine.0340-22)

Introduction

Micrococcus luteus is a Gram-positive, coagulase-negative coccus that exists in the normal flora of the mammalian skin. Furthermore, it is said that *Micrococcus* species are detected in many places (e.g. soil, dust, water, air, polar ice, mucous membranes, plants, cheese, sausages, activated sludge, industrial effluents, and sponge) (1). It also colonizes the human skin, mouth, and mucosa. Although it is considered to be nonpathogenic, it can be pathogenic in immunocompromised individuals (2).

Bacteremia caused by *Micrococcus* species has been reported in hemodialysis (3) and peritoneal dialysis (PD) (4) patients. Several studies have reported that *Micrococcus* species can cause relapsing (2, 4) and refractory (4, 5) peritonitis. Kao et al. proposed the intraperitoneal (IP) administration of vancomycin for at least two weeks as treatment for *Micrococcus* species-related peritonitis (4); however, the optimal treatment (e.g. the selection of an appropriate antimicrobial drug and duration of therapy) has not been clarified.

We herein report a PD patient with *M. luteus*-related peritonitis who was successfully treated by the intraperitoneal administration of vancomycin-free antibiotics for three weeks.

Case Report

A 69-year-old woman visited the emergency department complaining of cloudy peritoneal dialysate without any abdominal pain. She had undergone continuous ambulatory PD using manual exchange as a result of end-stage kidney disease for two years due to diabetic kidney disease. Her regime was 1.5 L of 1.5% dextrose low-calcium dialysate once in a 4- to 5-h dwelling and once in a 9- to 10-h dwelling. Her comorbidities included coronary artery disease, hyperuricemia, hypertension, and hyperlipidemia. She had previously developed culture-negative peritonitis eight months ago. At the time, she had been treated with cefazolin and ceftazidime for 14 days. Her height was 143.4 cm, and her body weight was 50.9 kg. At the time of admission, her blood pressure was 109/57 mmHg, her heart rate was 80

beats/min, and her body temperature was 36.9 °C. There were no signs of exit-site infection or tunnel infection. The white blood cell (WBC) count of the dialysate effluent was 4,784/ μ L with a neutrophil count of 3,990/ μ L (83.4% of the total WBC count). The initial laboratory tests showed a WBC count of 11,620/ μ L. She was diagnosed with PD-associated peritonitis and initially given IP cefazolin (1 g/day) and ceftazidime (1 g/day). These antibiotics were IP retained for 6 h every day. At 3 days after treatment, the WBC count of the dialysate effluent was 110/ μ L with a neutrophil count of 19.6/ μ L (17.8% of the total WBC count). On the 6th day, *M. luteus* was detected by a culture test, and drug sensitivity was revealed on the 15th day (Table 1). Therefore, antibiotic deescalation was performed by discontinuing ceftazidime the same day. Her symptoms remained stable (Figure), and treatment with IP cefazolin (1 g/day) was continued up to 21 days. She remained disease-free until 22 months later, when she developed PD-related peritonitis with *Pseudomonas aeruginosa*.

Table 1. Drug Sensitivity of *Micrococcus Luteus* in This Case.

Benzylpenicillin	sensitive
Ampicillin	sensitive
Cefazolin	sensitive
Cefmetazole	sensitive
Imipenem and cilastatin sodium	sensitive
Gentamicin	sensitive
Erythromycin	sensitive
Minocycline	sensitive
Vancomycin	sensitive
Levofloxacin	sensitive

The disc method was used to test bacterial susceptibility to various antibiotics.

Discussion

We found two important clinical issues: (1) *Micrococcus* species-related peritonitis may sometime be cured without vancomycin, and (2) it may be important to provide three weeks of treatment.

Micrococcus species-related peritonitis is rarely reported. The incidence of *Micrococcus* species-related peritonitis is approximately 2% (18/750) (5). Our present patient was a farmer who worked in her fields on a daily basis. This lifestyle increased the likelihood of *M. luteus*-related peritonitis, as *Micrococcus* species are known to exist in the natural environment, such as the soil and water (1).

Cases of infection with other Gram-positive organisms, except for *Staphylococcus aureus* and *Streptococci*, are recommended to receive a two-week treatment regimen according to the International Society for Peritoneal Dialysis (ISPD) guidelines (6). Kao et al. proposed the IP administration of vancomycin for at least two weeks for *Micrococcus* peritonitis (4). Three cases were reported in their paper; however, the patient who was curatively treated received vancomycin for more than 21 days. Those authors' findings did not provide any evidence to support the notion that 14 days of treatment was sufficient. Furthermore, the details of seven cases (other than the present case) of *Micrococcus* species-related peritonitis have been reported in the relevant English literature (Table 2) (2, 4, 7). None of these cases were curatively treated within 14 days, but some were curatively treated after longer treatment without vancomycin. In addition, *M. luteus* has high sensitivity to β -lactam antibiotics (8). It is therefore not essential to choose vancomycin when treating such patients.

Based on the present and previous findings, continuing to administer vancomycin is not expected to be an effective treatment for the next generation of infectious diseases. Therefore, we suggest the importance of long-term antibiotic

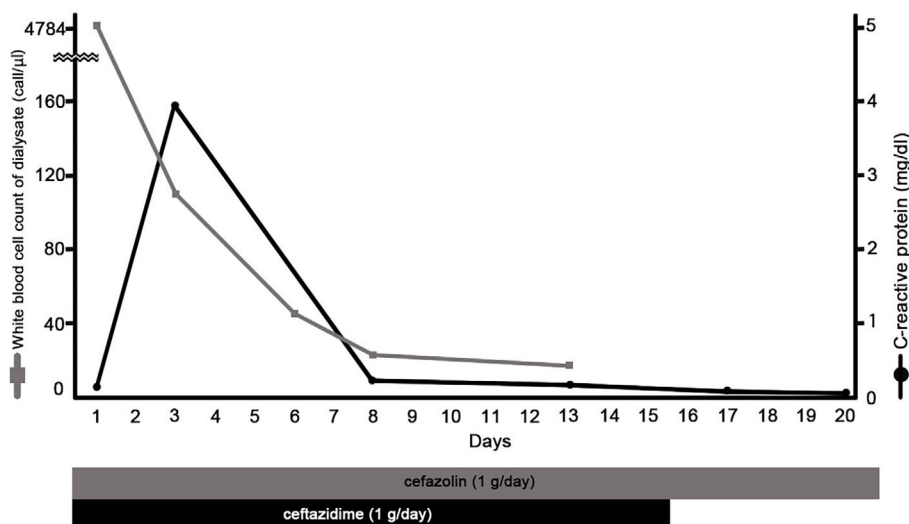


Figure. The clinical course.

Table 2.

	age	sex	Comorbidity	Past medical history	Treatment	Result
Su Hyun Song et al., 2019	59	F	HT, Diabetes	N/A	CEZ 15mg/kg/day+CAZ 1g/day 3days (IP) ->VCM 2g(loading)(IP) ->VCM 1g every 7days	removal of PD catheter
Chih-Chin Kao et al., 2014-1	54	M	HT, HL, Gout, old CVA	Peritonitis(S.aureus<twice>, Corynebacterium<once>)	VCM 1g(loading)(IP) ->VCM 500mg (IP) every 3days 8times	Cure
Chih-Chin Kao et al., 2014-2	40	M	HT, SHPH	Peritonitis(P.oryzihabitans<twice>, CNS<twice>, NF- GNB<once>, culture negative<once>)	CEZ 1g/day+CAZ 1g/day (IP) ->CEZ 1g/day (after culture reported), total 14days	Relapsing, repeat episodes ->removal of PD catheter
Chih-Chin Kao et al., 2014-3	63	M	CAD, HT, HL, gout	N/A	CEZ 1g/day+CAZ 1g/day (IP) 4days ->VCM 1g(loading)(IP) ->VCM 500mg (IP) every 3days	Refractory ->removal of PD catheter
Magee JT et al., 1990-1	56	M	N/A	N/A	VCM(IP) N/A (duration and dose)	Cure
Magee JT et al., 1990-2	77	M	N/A	N/A	VCM(IP) N/A (duration and dose)	Recurred ->CEF(IP) got him cure
Magee JT et al., 1990-3	42	F	N/A	N/A	CEF(IP) N/A (duration and dose)	Failure ->removal of PD catheter
The present case	69	F	CAD, HU, HT, HL	Peritonitis (culture negative<once>)	CEZ 1g/day+CAZ 1g/day 16days (IP) ->CEZ 1g/day 5days, total 21days	Cure

CAD: coronary artery disease, CAZ: ceftazidime, CEF: cefuroxime, CEZ: cefazolin, CNS: coagulase-negative staphylococci, F: female, HL: hyperlipidemia, HT: hypertension, HU: hyperuricemia, M: male, NF-GNB: non-fermenting Gram-negative bacilli, SHPT: secondary hyperparathyroidism, VCM: Vancomycin

therapy (longer than 21 days). Furthermore, various types of antibiotics might be effective as treatment as long as sensitivity is present.

In summary, we reported that three-week treatment without vancomycin resulted in long-term remission of *M. luteus*-related peritonitis. A sufficient treatment period of three weeks may give rise to long-term remission from *M. luteus*-related peritonitis.

The authors state that they have no Conflict of Interest (COI).

Acknowledgement

Not applicable.

Ethics approval and consent to participate

Not applicable.

Consent for publication

Written informed consent was obtained from the patient for the publication of this case report.

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