Peritonitis Associated with Vancomycin-Resistant \textit{Lactobacillus rhamnosus} in a Continuous Ambulatory Peritoneal Dialysis Patient: Organism Identification, Antibiotic Therapy, and Case Report

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Received 20 January 1998/Returned for modification 20 February 1998/Accepted 24 March 1998

A case of \textit{Lactobacillus rhamnosus}-associated peritonitis in a patient undergoing continuous ambulatory peritoneal dialysis is reported. The patient was treated with vancomycin after isolation of glycopeptide-susceptible coagulase-negative staphylococci. After a skin rash developed, vancomycin was discontinued and replaced with teicoplanin. Seven weeks after the glycopeptide therapy was discontinued, a \textit{Lactobacillus} strain was isolated in pure cultures. The isolate was identified first incorrectly as \textit{L. acidophilus} but later correctly as \textit{L. rhamnosus}. Antibiotic susceptibility testing showed that the isolate was resistant to glycopeptides but susceptible to several other antibiotics. The antibiotic treatment was then switched to imipenem and was successful.

\textbf{Case report.} A 57-year-old man was referred for end stage renal disease. He had a history of diabetes mellitus since 1976 and had been treated with insulin since 1989. Peripheral vascular disease was treated with a femoropopliteal vascular graft in 1991; in September 1995, the right leg had to be amputated at the thigh. The patient also had chronic osteomyelitis after an injury in 1946; he had amyloidosis of the stomach and esophagus proven by biopsy. A peritoneal dialysis catheter was inserted in December 1995, CAPD was started without complications, and the patient was discharged.

In January 1996, 4 weeks after starting CAPD, he presented with abdominal pain, a cloudy peritoneal effluvate, and fever. The dialysate grew \textit{Candida glabrata}, and the patient was treated intraperitoneally (i.p.) with fluconazole and teicoplanin for 6 weeks. In April 1996, the patient again presented with clinical signs of peritonitis and was treated first with fluoroacillin while continuing the application of teicoplanin. The dialysate was microbiologically analyzed on the first day and grew coagulase-negative staphylococci 4 days later that were resistant to oxacillin, ceftotan, and imipenem but susceptible to vancomycin and teicoplanin. The therapy was switched to i.p. administered vancomycin for 2 days, but after a skin rash developed, the vancomycin was discontinued and replaced with teicoplanin until the end of April. In June 1996, the dialysate became cloudy and abdominal discomfort developed. One week later, the patient had persistent abdominal discomfort and a temperature of 37.5°C. He was treated outside the hospital with metronidazole and ceftriaxone for 1 week. He was then readmitted to the hospital with abdominal pain, a cloudy peritoneal effluvate, and fever. The dialysate contained 570 leukocytes/μl, the cell count increased to 7,300/μl in the following days, and the dialysate grew gram-positive organisms that were later identified as \textit{L. rhamnosus}. The \textit{Lactobacillus} isolate was resistant to vancomycin and teicoplanin but susceptible to imipenem and ciprofloxacin. The patient was treated with i.p. administered imipenem, and the peritonitis gradually improved over the next 3 weeks.

Microbiology. Peritoneal dialysate cultures were examined between 22 June and 2 July 1996. Peritoneal dialysate was...
showed only a limited number of resistances; the most important one was glycopeptide resistance. Compared to other \textit{L. rhamnosus} strains from clinical material and to the type strain, there were no major differences. The MICs (in micrograms per milliliter) and interpretations (susceptible [S], intermediate [I], and resistant [R]), respectively, for strain \textit{V7418} were as follows: penicillin, G, 0.25 and S; ampicillin, 0.5 and S; methicillin, 16 and R; cephalothin, 32 and R; ceftriaxone, 8 and S; amoxicillin/clavulanic acid (2:1), 0.25 and 0.125 and S; erythromycin, <0.125 and S; tetracycline, <0.5 and S; vancomycin, <0.5 and S; clindamycin, <0.25 and S; gentamicin, <2 and S; imipenem, 2 and S; chloramphenicol, <2 and S; rifampicin, 0.125 and S; ciprofloxacin, 0.25 and S; trimethoprim/sulfamethoxazole (1:2), 0.5 and S; and R; teicoplanin, 16 and I; and S; LY333328, 16 and I; avoparcin, >1,024 and R. LY333328 is a newly developed glycopeptide which is currently available only for research. Avoparcin (a glycopeptide), virginiamycin, and tylosin (both macrolides) are used as feed additives. For interpretation of the results obtained with the three feed additives and the new antibiotic LY333328, the interpretative guide for related substances was used, i.e., the vancomycin guideline for avoparcin and LY333328 and the erythromycin guideline for the macrolide tylosin and virginiamycin. \textit{Pseudomonas aeruginosa} ATCC 27853, \textit{Enterococcus faecalis} ATCC 29212, \textit{Staphylococcus aureus} ATCC 29213, and \textit{Escherichia coli} ATCC 25922 were used as reference strains.

**Discussion.** The API 20E and API 20NE biochemical test kits are not recommended for the identification of lactobacilli, but the reactions of these kits were combined and an identification scheme for lactobacilli described by Kandler and Weiss (6) was used. Nevertheless, they were only useful for identification of the genus \textit{Lactobacillus} and not for species identification. For species identification, the API 50CHL test kit, which was specifically designed for lactobacilli, is more suitable. However, for reliable identification, no commercial test kit can be recommended. Macrodilution tube tests including physiological parameters like growth temperatures are necessary (9). Molecular techniques like protein fingerprinting or gene probes could be used as well (9, 18). Species identification is important for determination of the epidemiology of \textit{Lactobacillus}-associated infections.

As far as we could ascertain, only three cases of CAPD peritonitis caused by \textit{Lactobacillus} spp. have been reported. Two of them were associated with vancomycin-resistant \textit{L. rhamnosus} strains (14–16), and one was associated with a vancomycin-resistant \textit{L. acidophilus} strain (17). In these cases, the \textit{Lactobacillus} strain appeared as an isolate in the peritoneal dialysate from the beginning of the infection. In the case reported here, the \textit{Lactobacillus} appeared only after intensive treatment with vancomycin and teicoplanin directed against coagulase-negative, oxacillin-resistant staphylococci. Species identification is not necessary to avoid ineffective antibiotic therapy. Routine screening for glycopeptide resistance (e.g., on agar plates containing vancomycin at 4 μg/ml) would be more useful. The importance of screening for glycopeptide-resistant isolates has been recently underscored by the isolation of the first vancomycin-resistant clinical strain of methicillin-resistant \textit{Staphylococcus aureus}. This strain was described by a Japanese group (4, 19), and the first such European strain has yet to be confirmed (11).

The general role of lactic acid bacteria (LAB) in clinical infections has been recently evaluated by a working group consisting of food microbiologists and clinical microbiologists (1). It was stated that LAB, including lactobacilli, can be considered safe, although some strains have been involved in op-
portunistic infections. No case has been described in which lactobacilli from food or fermented products were the causative agents of an infection. Superinfection with LAB from a patient’s own microflora (the clinical strains did not differ from strains of the patient’s flora) is possible only in an immunocompromised host (1).

We thank Dorothea Jaeger for excellent technical assistance.

REFERENCES