

## Recurrent chronic ambulatory peritoneal dialysis-associated infection due to *Rothia dentocariosa*

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*Rothia dentocariosa* is a commensal organism of the human oropharynx. Clinical infection due to this organism is rare. A case of recurrent peritoneal dialysis-related peritonitis caused by *R dentocariosa* and a review of the literature is reported. Isolation of *R dentocariosa* from dialysate fluid should not be dismissed as a contaminant. Although there are no interpretive criteria for antimicrobial susceptibility testing, *R dentocariosa* appears to be susceptible to a variety of antibiotics including beta-lactams, vancomycin and aminoglycosides. Optimal therapy of peritoneal dialysis peritonitis caused by this organism may also require removal of the catheter.

**Key Words:** Peritoneal dialysis; Peritonitis; *Rothia dentocariosa*

*Rothia dentocariosa* is a commensal organism of the human oropharynx. *R dentocariosa* has been associated with dental caries and periodontal disease (1,2); rarely, it causes serious infections, most notably infective endocarditis (3,4). It has also been reported to cause arteriovenous fistula infection (5), pilonidal abscess (6), pneumonia (7,8) and endophthalmitis (9). We present a case of recurrent peritoneal dialysis (PD) peritonitis due to *R dentocariosa*, and review the literature.

### CASE PRESENTATION

The patient was a 41-year-old woman with end-stage renal disease secondary to ureteric reflux. She had a bilateral nephrectomy and renal transplant in 1991. The transplant subsequently failed, necessitating the institution of PD in 1992. She had one episode of chronic ambulatory peritoneal dialysis peritonitis in the late 1990s, successfully treated with antimicrobial therapy alone.

In November 2002, during hospitalization for an unrelated condition, she developed nausea, vomiting, abdominal pain and tenderness, chills and fever (temperature 38.9°C). Peripheral leukocyte count was  $18.9 \times 10^9/L$  with a neutrophilic predominance. Dialysate fluid was cloudy, with a leukocyte count of  $0.5 \times 10^9/L$  (96% neutrophils). Gram stain of the dialysate revealed Gram-positive cocci. Dialysate was inoculated directly onto solid media and into thioglycollate broth;

### Une infection au *Rothia dentocariosa* associée à une dialyse péritonéale ambulatoire chronique et récurrente : Rapport de cas et analyse bibliographique

Le *Rothia dentocariosa* est un organisme commensal de l'oropharynx humain. L'infection clinique à cet organisme est rare. Le compte rendu d'un cas de péritonite associée à une dialyse péritonéale récurrente causée par le *R dentocariosa* et une analyse bibliographique sont présentés. L'isolement du *R dentocariosa* dans le soluté ne devrait pas être exclu à titre de contaminant. Bien qu'il n'existe aucun critère interprétatif des épreuves de susceptibilité antimicrobienne, le *R dentocariosa* semble être susceptible à une variété d'antibiotiques, y compris les bêta-lactamines, la vancomycine et les aminoglycosides. Le traitement optimal d'une péritonite associée à une dialyse péritonéale causée par cet organisme peut également exiger le retrait du cathéter.

*R dentocariosa* subsequently grew on blood agar and in broth. Additional dialysate was inoculated directly into aerobic and anaerobic blood culture bottles; *Capnocytophaga* species DF1 grew in the anaerobic bottle and *R dentocariosa* in the aerobic bottle. *R dentocariosa* was identified from all specimens using API Coryne strips (BioMerieux, Canada). Abdominal radiographs and computed tomography showed no intra-abdominal pathology other than a dilated gallbladder. The patient, who had a beta-lactam allergy, received intraperitoneal (IP) gentamicin for one week, with clinical resolution. Subsequently, susceptibility testing was performed by E-test (Oxoid, Canada). The organism failed to grow on Mueller-Hinton agar and Mueller-Hinton agar with sheep blood (QUELAB, Canada); therefore, E-tests were performed on blood agar plates which were incubated in 5% CO<sub>2</sub> at 35°C for 24 h. Results of susceptibility testing by E-test are shown in Table 1; although no NCCLS interpretive criteria exist for *R dentocariosa*, the gentamicin minimal inhibitory concentration of 8 µg/mL suggested gentamicin resistance. The isolate also appeared to be susceptible to cefazolin, linezolid and amoxicillin-clavulanate by the disk-diffusion method (zone sizes 37 mm, 38 mm and 42 mm, respectively). Catheter removal was considered but was not performed due to other medical issues; furthermore, the clinical improvement with antimicrobial therapy alone was judged to be complete.

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**TABLE 1**  
**Results of antimicrobial susceptibility testing of the original isolate of *Rothia dentocariosa*. Minimal inhibitory concentrations (MICs) were obtained by E-test**

Antibiotic	MIC ( $\mu\text{g/mL}$ )
Penicillin	0.004
Ceftriaxone	0.008
Imipenem	0.047
Trimethoprim-sulfamethoxazole	0.50
Vancomycin	2
Clindamycin	4
Gentamicin	8

In January 2003, five weeks after completing therapy, she presented to the emergency department with a one-day history of abdominal pain and cloudy PD fluid. Dialysate contained  $0.4 \times 10^9/\text{L}$  leukocytes (92% neutrophils) and again grew *R dentocariosa*; however, susceptibility testing was not performed on this isolate. She was treated as an outpatient with IP vancomycin and gentamicin, but required admission to hospital four days later with worsening symptoms despite improvement in dialysate laboratory values. Subsequent blood and dialysate cultures were negative. IP vancomycin and gentamicin were continued, and oral trimethoprim-sulfamethoxazole (TMP/SMX) was added to the regimen, with subsequent clinical resolution following a total of two weeks of therapy. The patient refused to have the PD catheter removed at this time. She was symptom-free at follow-up 11 days post discharge.

Peritoneal symptoms recurred for a third time in February 2003, 18 days following completion of antimicrobial therapy. Dialysate at this time contained  $0.3 \times 10^9/\text{L}$  leukocytes (78% neutrophils) and grew *R dentocariosa*; susceptibilities were not performed. The patient was readmitted and retreated initially with IP vancomycin, IP gentamicin and oral TMP/SMX. The PD catheter was removed and hemodialysis was initiated; culture of the catheter tip was negative. Symptoms resolved rapidly following catheter removal. Intravenous (IV) vancomycin alone was continued for two weeks postoperatively. She had no recurrence of abdominal symptoms, and a PD catheter was successfully reinserted in July 2003.

### REVIEW OF THE LITERATURE

Three previous cases of PD peritonitis involving *R dentocariosa* have been reported (10-12). In each case the patient presented in a manner indistinguishable from PD peritonitis caused by other organisms; they had a history of abdominal pain and fever, and cloudy dialysate with an elevated leukocyte count. The first patient was treated with TMP/SMX, but developed neutropenia and subsequently responded to a combination of oral amoxicillin/clavulanate and IV amikacin; the catheter was removed because of "relapsing episodes of peritonitis" which were not described further (10). The second patient improved rapidly with IP cefazolin and netilmicin and did not require catheter removal (11). In these two cases, therapy was guided by susceptibility testing performed by the disk-diffusion method. In a third report, both Centers for Disease Control and Prevention coryneform group A-4 and *R dentocariosa* were identified in dialysate from a symptomatic patient (12). The authors attributed the clinical presentation to the coryneform bacteria only, and the role of *R dentocariosa* was uncertain. This infection responded to a full course of vancomycin.

### DISCUSSION

*R dentocariosa* is the only species in the genus *Rothia*. It is a nonspore forming, nonmotile, aerobic or facultatively anaerobic organism that inhabits the human oropharynx. Growth on blood agar plates produces either smooth or rough colonies. On Gram stain, organisms may appear as Gram-positive cocci, coccobacilli or filamentous branching rods (13). Antimicrobial susceptibility testing is not standardized and there are no NCCLS interpretive criteria. However, most strains appear to be susceptible to penicillin (13) and this is considered to be the treatment of choice (3,4); gentamicin or rifampin may be added for synergy (14). Other antimicrobial agents used with success include beta-lactam/beta-lactamase inhibitor combinations, cephalosporins, clindamycin, TMP/SMX, ciprofloxacin and vancomycin (3,15). The prevalence of antimicrobial resistance is unknown, but resistance to TMP/SMX and gentamicin have been reported (16,17).

*Rothia* is an unusual cause of human disease. Bacteremia is uncommon and usually transient, occurring in the absence of other deep-seated infection (15,18). However, septicemia has been reported in a neutropenic patient (19). Endocarditis is the most frequently reported infection due to *R dentocariosa*, and may affect both native and prosthetic valves (3,14). It is typically subacute in presentation, but has a high rate of complications (3) including perivalvular abscess (4,20), intracerebral hemorrhage and mycotic cerebral aneurysms (3,21), brain abscess (22), osteomyelitis (23) and abdominal aneurysm (24). Other clinically significant infections due to *R dentocariosa* are exceedingly rare. Pneumonia has been reported as the first presentation of lung cancer (7), and as an opportunistic infection in a patient with leukemia (8). *R dentocariosa* has also caused infection of a revised arteriovenous fistula (5), a pilonidal abscess (6) and endophthalmitis (9).

Pneumonia caused by *R dentocariosa* likely occurs via direct inoculation from the oropharynx. Most other *Rothia* infections, including PD peritonitis, presumably result from hematogenous spread from a gingival or periodontal source. Periodontal disease appears to be common in patients with *Rothia* endocarditis (14,15), and *R dentocariosa* was grown from dental and nasopharyngeal cultures in one case of PD peritonitis (11). Our patient did not have unusually poor dentition. A root canal had been performed remotely, and she had multiple caries and fillings in all molars as well as moderate periodontitis with gum retraction. Gingival cultures obtained after treatment of the third episode of peritonitis yielded *R dentocariosa*.

Our description of recurrent *R dentocariosa* PD peritonitis again illustrates the potential pathogenicity of this organism, and the necessity of PD catheter removal to cure this infection. Despite the resolution of both clinical and lab parameters, and the absence of physical or radiographic evidence of ongoing infection, the organism persisted subclinically. *R dentocariosa* has been known to be a persistent pathogen in the presence of prosthetic devices (25). Without catheter removal, antibiotics were unable to eradicate the organism and prevent recurrence of clinical infection. *R dentocariosa* has now been described as a confirmed cause of PD peritonitis in three patients, including ours. Further experience may elucidate the best therapeutic approaches to treatment of infections caused by this unusual organism.

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