Rothia Mucilaginosa Peritonitis Complicating Peritoneal Dialysis

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ABSTRACT

For the 11% of dialysis patients worldwide who receive peritoneal dialysis (PD) to treat their end-stage kidney disease (ESKD), recent PD-associated peritonitis is estimated to contribute to 5-30% of reported mortality.[1,2] These infections are most commonly caused by coagulase-negative *Staphylococcus* (32%), followed by culture-negative peritonitis (16%), and the timely identification and targeted treatment of peritonitis is critical to avoid complications such as PD catheter removal.[3] Here, we present a case of atypical *Rothia mucilaginosis* peritonitis in a PD patient.

KEYWORDS: peritonitis, rothia mucilaginosa, peritoneal dialysis, PD-associated peritonitis

CLINICAL PRESENTATION

A 48-year-old woman with a history of ESKD secondary to infection-associated glomerulonephritis on continuous cycling peritoneal dialysis (CCPD) for three years, presented with a one-day history of abdominal pain. She had been in her usual state of health until the prior day, when she began experiencing suprapubic abdominal pain, accompanied by nausea, vomiting, fevers, chills, and foul-smelling urine. Her past medical history was significant for Type 2 diabetes mellitus, hypertension, secondary hyperparathyroidism, anemia, and obstructive sleep apnea. Medications included calcitriol 2mcg daily, metoprolol succinate 100mg daily, torsemide 100mg twice daily, darbepoetin alfa in polysorbate 140mcg injection weekly. Her only allergy was to oxycodone, which resulted in hives.

Previously, the patient had a history of *Streptococcus mitis* peritonitis (3.5 years prior) that required PD catheter replacement as well as a Pseudomonas exit site infection (six months prior) treated with two weeks of intraperitoneal vancomycin. One month prior to this admission, the patient had *Staphylococcus epidermidis* peritonitis and completed two weeks of intraperitoneal vancomycin.

On examination, the temperature was 98.0, the blood pressure 153/79 mm Hg, the heart rate 83 beats per minute, the respiratory rate 20 breaths per minute, and the oxygen saturation 97% while the patient was breathing ambient air. Cardiopulmonary exam was notable for clear lung fields and no adventitious cardiac sounds. The mucous membranes were moist. Abdominal exam was notable for mild, diffuse tenderness to palpation without rebound or guarding. The peritoneal catheter exit site did not show any drainage or erythema. Edema was absent. Presentation labs were notable for a BUN 41, creatinine 11.7, and WBC of 7.7.

A clear peritoneal effluent sample showed 257 cells/mm^3 with 79% neutrophils. Treatment for presumed peritonitis was started with intraperitoneal vancomycin and IV ceftriaxone, and subsequently narrowed as culture speciated vancomycin-sensitive *S. mitis* and *R. mucilaginosa*. The patient completed a two-week course of intraperitoneal vancomycin and, at her two-week post-discharge follow-up appointment, reported improvement of her general abdominal pain with persistence of pain at the drain during cycling.

DISCUSSION

This patient receiving peritoneal dialysis with a history of peritonitis and recent antibiotic use was found to have *R. mucilaginosa* infection, a rarely reported pathogen in the peritoneal dialysis patient. *R. mucilaginosa* is an encapsulated, biofilm forming, gram-positive and catalase-positive coccus, that is usually part of normal oropharyngeal and upper respiratory tract flora.

R. mucilaginosa is commonly associated with dental plaque or other periodontal disease but has been reported to cause severe or systemic infection in some patients. In particular, patients with history of malignancy, neutropenia, or other immunosuppressing conditions or medications, are at increased risk of *R. mucilaginosa* bacteremia, and hardware-associated *R. mucilaginosa* infections have been reported for patients with central lines, prosthetic valves, subdural drains, and PD catheters.[4,5] Treatment with ciprofloxacin, which *R. mucilaginosa* is often resistant to, is an established risk factor for both PD-associated peritonitis and non-peritonitic infections.[5,6] Although our patient did not have a history of ciprofloxacin treatment, she did have a recent two-week course of intraperitoneal vancomycin within one month prior to her *R. mucilaginosa* peritonitis, which may have allowed the opportunistic growth of this usually commensal bacterium.

R. mucilaginosa has rarely been associated with peritonitis, and of the five cases of *R. mucilaginosa* peritonitis reported

Table 1. Case reports of PD-associated peritonitis from r. mucilaginosa

Ref	Age/Sex	Prior peritonitis	Relevant medical history	Modality*	Symptoms	Antibiotic regimen and duration**	Outcome
11	57F	1x Culture negative	Kidney allo-transplant, removed secondary to glomerulo-nephritis	CAPD	Fever to 40*C, cloudy effluent	Cephalothin + aztreonam (intraperitoneal), duration not described	Full resolution without recurrence, though transitioned to hemodialysis
6	58M	2 x streptococcus mitis	DM HTN	CAPD	Cloudy effluent, abdominal pain	Cefazolin and ceftazidime (intraperitoneal), 2 weeks	Full resolution without recurrence
10	49M	1x klebsiella oxytoca 1x micrococcus .sp 1x Culture negative	Hypertensive nephrosclerosis	CAPD	Cloudy effluent, abdominal pain	Amoxicillin and rifampin, duration not described	Full resolution without recurrence
8	41F	none	2 failed kidney transplants, Poor dentition	CCPD	Cloudy effluent, diffuse abdominal pain	Vancomycin (intraperitoneal) and rifampin (oral), 3 weeks	Full resolution without recurrence
7	60M	3x Culture negative 1x coagulase-negative staphylococcal	HIV nephropathy	CCPD	Cloudy effluent, diffuse abdominal pain	Vancomycin (intraperitoneal), 2 weeks	Full resolution without recurrence

* CAPD: Continuous ambulatory peritoneal dialysis; CCPD: Continuous cyclic peritoneal dialysis.
**Describes the final antibiotic regimen used; in many cases, patients were started on different antibiotics empirically

in the English literature (**Table 1**), all were in patients undergoing peritoneal dialysis. The most common agent of PD-associated peritonitis is coagulase-negative Staphylococci, among which *Staphylococcus epidermidis* is the most frequent.[3] However, there is speculation that *R. mucilaginosa* may be underreported, as it is not commonly included in automated microbiologic identification system databases.[7,8]

There are no definitive guidelines on the treatment of R. mucilaginosa infections, though the International Society for Peritoneal Dialysis guidelines suggest empiric coverage for gram-positive organisms with vancomycin or a cephalosporin, which was the regimen chosen in 4 of 5 cases and resulted in full symptom resolution.[9] Beyond early identification and broad antibiotic coverage, recommendations for PD-associated *R. mucilaginosa* peritonitis are similar to general peritonitis ISPD guidelines; best practices including the use of systemic prophylactic antibiotics and disconnect systems with a "flush and fill" design, and that catheter exchange may be indicated for cases of refractory (failure of effluent to clear after five days) or relapsing (re-infection with same organism within four weeks) bacterial peritonitis. In patients with repeat (re-infection with same organism after four weeks) peritonitis, careful root-cause analysis should be performed to identify the etiology of infection and potential interventions regarding sterile technique or patient retraining. Local laboratories may not always provide antibiotic sensitivities for *R. mucilaginosa* as the Clinical Laboratory Standard Institute guidelines do not cover these infections. Delays in treatment of *R. mucilaginosa* peritonitis were reported for two patients, though effective antibiotic therapy was ultimately started without significant complication.[6,10] In three patients, there is documentation of known risk factors associated with *R. mucilaginosa* infection, with one patient's initial malignancy diagnosis occurring during this work-up, highlighting the importance of managing comorbidities and regular preventative screening for these patients with complex medical conditions.

In conclusion, although *R. mucilaginosa* is a rare cause of PD-associated peritonitis and specific guidelines are not yet available, these infections are readily treatable with antibiotics. Continued documentation of *R. mucilaginosa* infections and effective regimens are necessary for early organism identification and the prevention of treatment delays and poor patient outcomes.

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