Nocardiosis is an opportunistic infection especially in patients with underlying chronic debilitating disease or immunodeficiency. Nocardia peritonitis is an uncommon infection in peritoneal dialysis patients. Here, we report a case of peritonitis by Nocardia asteroides during automated peritoneal dialysis in a 35-year-old male patient who had prolonged immunosuppressive therapy to treat acute rejection of a nonfunctioning kidney allograft.

The patient presented at our outpatient clinic with typical symptoms of acute peritonitis. The peritoneal fluid leukocyte count was 20,500 cells/μL, with 90% neutrophils. Gram staining showed gram-positive filamentous bacilli later identified as N. asteroides. After bacterial identification, the patient received trimethoprim 320 mg and sulfamethoxazole 3200 mg intravenously every 48 hours (TMP-SMX), plus amikacin 100 mg intraperitoneally daily. The immunosuppressive therapy was reduced.

Peritoneal fluid cultures became negative after 1 week of treatment, concomitant with clinical improvement. Unfortunately, after 5 weeks of therapy, the patient developed hematologic side effects attributable to the TMP-SMX treatment. The TMP-SMX was suspended at that time, and the patient then received cefuroxime 500 mg by mouth and amikacin 100 mg intraperitoneally daily for a total of 12 weeks. The patient recovered completely and was discharged 3 months after onset of the peritonitis.

Prolonged antibiotic therapy without catheter removal has not been previously described in immunosuppressed patients with APD peritonitis. The combination of amikacin and TMP-SMX may be safe and effective in APD patients who develop N. asteroides peritonitis.

Key words
Nocardia asteroides, peritonitis

Introduction
Nocardia asteroides is an aerobic, gram-positive, partially acid-fast rod that characteristically produces a mycelium, but that often fragments into bacillary and coccid elements (1). N. asteroides is the causative agent of a number of disease processes in several different species of animals, birds, and fish.

Nocardia is found in soil around the world. It can be acquired by inhaling contaminated dust or by soil contamination of a wound. The main risk factors for nocardiosis are a weakened immune system (2); chronic lung disease (3); chronic steroid therapy (4); cancer, organ, or bone marrow transplantation (2,5); or AIDS (6).

Case report
A 35-year-old male patient with chronic renal failure secondary to congenital bilateral ureteral stenosis had undergone renal transplantation at the age of 11 years. The patient developed chronic allograft nephropathy, and automated peritoneal dialysis (APD) was initiated 30 months before the admission discussed in the present paper. The patient’s immunosuppressive therapy was suspended 18 months after the start of APD.

Two months before admission, the patient experienced acute rejection of the nonfunctioning kidney
allograft. At that time, methylprednisolone 2 g and cyclosporine 160 mg daily was reinitiated. The patient had had no history of bacterial or fungal infections in the preceding years.

Shortly thereafter, the patient presented at our outpatient clinic with symptoms typical of acute peritonitis. The peritoneal fluid leukocyte count was 20,500 cells/μL, with 90% neutrophils. Gram staining showed a gram-positive bacillus later identified as *N. asteroides*. The patient initially received vancomycin 1 g intravenously and ceftazidime 1 g intraperitoneally. After bacterial identification, the ceftazidime was stopped, and the patient received trimethoprim 320 mg and sulfamethoxazole 3200 mg intravenously every 48 hours (TMP-SMX), plus amikacin 100 mg intraperitoneally daily. The immunosuppressive therapy was reduced to methylprednisolone 8 mg and cyclosporine 100 mg daily.

Peritoneal fluid cultures became negative after 1 week of treatment, concomitant with clinical improvement. After 19 days of treatment, oral TMP-SMX was prescribed; however, that treatment had to be suspended 1 month later because of severe anemia. The patient then received cefuroxime 500 mg by mouth and amikacin 100 mg intraperitoneally daily for a total of 12 weeks. The patient recovered completely and was discharged 3 months after onset of the peritonitis, having persisted on APD.

Discussion

In the general population, *Nocardia* is a rare cause of infection. It affects mainly immunocompromised patients (2), although it can infect and exist as a saprophyte in normal hosts (7).

In patients with chronic renal failure undergoing peritoneal dialysis, *N. asteroides* has been only rarely described as the cause of peritonitis (8,9). Previous reports suggest that the organism may respond to TMP-SMX treatment with or without peritoneal catheter removal (8–10). The case reported here suggests that peritonitis caused by *N. asteroides* is not symptomatically different from other bacterial peritonitis. Moreover, the Gram stain performed on dialysate effluent strongly suggested *Nocardia* infection, facilitating early treatment.

Trimethoprim–sulfamethoxazole has shown clinical efficacy and synergy in *N. asteroides* infection (11,12). Effective treatment of peritonitis has been reported after intraperitoneal administration of TMP-SMX (9), and in our case, we observed a prompt response to intravenous therapy with TMP-SMX (320 mg and 3200 mg daily, respectively) in combination with intraperitoneal amikacin, as described in a previous report (13). After 19 days of intravenous treatment, oral TMP-SMX was prescribed. Unfortunately, the oral TMP-SMX had to be stopped because the patient developed hematologic side effects attributable to the treatment. Therapy was continued with cefuroxime 500 mg by mouth and amikacin 100 mg intraperitoneally daily for a total of 12 weeks. The patient responded favorably, did not require peritoneal dialysis catheter removal, and remained on APD.

A review of the literature shows that *N. asteroides* infection has repeatedly been reported in renal transplant recipients. Infection localization is usually in the lungs, brain, and subcutaneous nodules. Heavy immunosuppression is a risk factor for nocardial infection in patients (2,12,14).

Conclusions

*N. asteroides* should be considered a rare infection. The case presented here shows *N. asteroides* peritonitis complicating APD in a renal transplant patient with an acute rejection episode. An appropriate antibiotic combination that includes TMP-SMX and amikacin is effective in the treatment of *N. asteroides* PD peritonitis. In the case of side effects such as severe anemia, cefuroxime plus aminoglycosides can be successfully used, avoiding peritoneal catheter removal.

References

5 Lin JT, Lee MY, Hsiao LT, *et al.* Pulmonary nocardiosis in a patient with CML relapse undergoing

Corresponding author:
Ana M. Ortiz, MD, Department of Nephrology, P. Catholic University, Lira 85, 4 Piso, Santiago, Chile.
E-mail: mortiz@med.puc.cl