Peritoneal dialysis associated peritonitis secondary to *Mycobacterium fortuitum*

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Abstract

We report a 23-year-old woman with systemic lupus erythematous, lupus nephritis (class IV), and end-stage renal disease on peritoneal dialysis who presented with abdominal pain, nausea, vomiting, and diarrhea for one week. A previous admission for peritonitis occurred one month earlier, and peritoneal fluid culture at that time was negative. She was discharged on three weeks of intraperitoneal cefepime and vancomycin. On the current admission, due to recurrent symptoms approximately two weeks after her antibiotics were discontinued, peritoneal fluid cultures were positive for Mycobacterium fortuitum. The peritoneal catheter was removed, and trimethoprim- sulfamethoxazole and ciprofloxacin were initially recommended for six months. This was later changed to trimethoprim-sulfamethoxazole and amikacin based on new susceptibilities.

M. fortuitum is a rapidly growing mycobacterial species (RGM) widely distributed in nature; tap water is the major reservoir. It can produce a wide range of infections in humans, and outbreaks have been reported in hospitals from contaminated equipment. Immunosuppression and chronic lung disease have been described as predisposing factors for RGM infection. Peritoneal dialysis associated with M. fortuitum infection occurs very rarely; no guidelines exist for treatment recommendations.

Key words: peritonitis, peritoneal dialysis, *Mycobacterium fortuitum*

Case Presenttion

A 23-year-old woman with systemic lupus erythematous, lupus nephritis (class IV), hypertension with retinopathy, chronic anemia, and end-stage renal disease on peritoneal dialysis since October 2013 presented to the emergency department in January 2014 with abdominal pain, nausea, vomiting, and diarrhea for one week. She admitted that during a recent road trip she had not strictly adhered to an aseptic technique during her peritoneal dialysis.

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Vital signs revealed blood pressure 98/64 mmHg, heart rate 122 beats/minute, respiration rate 27 breaths/minute, and temperature 100.9 °F. Her abdomen was tender in the lower quadrants bilaterally without rebound tenderness; a peritoneal dialysis catheter was in place with no erythema or drainage from the catheter site.

This patient had been on continuous ambulatory peritoneal dialysis (CAPD) with four exchanges

per day of 2 liters of 1.5% dialysate. She had been admitted in December 2013 with similar symptoms; the peritoneal fluid studies during that admission are shown in Table 1. A CT scan of her abdomen performed then was negative for intra-abdominal abscess. She was discharged on intraperitoneal cefepime and vancomycin for three weeks. One week prior to admission in January 2014, the patient again began to experience abdominal pain, and fluid was collected from her peritoneal catheter for culture. She was readmitted and started on empiric treatment with intravenous meropenem and vancomycin for seven days. Peritoneal fluid studies are shown in Table 1; cultures grew out *Mycobacterium fortuitum*. The peritoneal catheter was removed, six months of antimicrobial therapy with trimethoprim- sulfamethoxazole (TMP-SMX) and ciprofloxacin was started, and she was started on hemodialysis. Treatment was modified based on susceptibility data to TMP-SMX and amikacin (Table 2). She has had no recurrent episodes of peritonitis on this treatment.

Table 1: Peritoneal fluid analysis

Variable	Dec 2013	Jan 2014
Color	Yellow	Yellow
Clarity	Clear	Hazy
Red Blood Cells (cells/mm^3)	10	585
White Blood Cells (cells/mm^3)	250	1232
Neutrophils (%)	61	64
Lymphocytes (%)	28	17
Monocytes (%)	11	10
Eosinophils (%)	0	5
Basophils (%)	0	0
Bands (%)	0	0
Macrophages (%)	0	4
Gram stain and aerobic/anaerobic culture	No growth	<1 + Gram positive rods resembling diptheroids

Table 2: Antimicrobial susceptibilities for *M. fortuitum*

Antibiotic	Minimal inhibitory concentration (mg/L)	Interpretation
TMP-SMX	1: 19	Susceptible
Ciprofloxacin	4	Resistant
Moxifloxacin	2	Intermediate
Cefoxitin	64	Intermediate
Amikacin	2	Susceptible
Doxycycline	>32	Resistant
Clarithromycin	8	Resistant
Linezolid	8	Susceptible
Imipenem	4	Susceptible
Minocycline	8	Resistant

Discussion

This patient had peritoneal dialysis associated peritonitis (PD-peritonitis) secondary to *Mycobacterium fortuitum*, which is a very uncommon etiologic agent for PD-peritonitis. *M. fortuitum* is a rapidly growing mycobacterium (RGM), which belongs to the nontuberculous mycobacteria (NTM), which has the unique characteristic of relatively rapid growth and culture positivity occurring in less than one week.[1,2,3] NTM are widely distributed in nature and have been isolated from water and soil. Tap water is the major reservoir.[1] There are five groups that comprise several species of RGM; the most significant include *M. fortuitum, M. abscessus, M. chelonae* (Table 3).[1,2]

These bacteria can produce a wide spectrum of diseases in immunocompetent and immunosuppressed patients and cause skin and soft tissue, catheter-related, bone, joint, lung, and central nervous system infections. Table 4 shows the most commonly found RGM by infection site.[1,2,3] There have been outbreaks of infection with RGM in hospitals from contaminated hospital equipment and water sources.[2] Predisposing factors for infection include an immunocompromised state (corticosteroids, HIV, malignancy) and chronic lung diseases (cystic fibrosis).[1]

The diagnosis is made by isolation of the organism directly from tissue and body fluid samples in non-pulmonary diseases. For pulmonary disease the

Table 3: Species belonging to the various groups of RGM

Group	Species
M. fortuitum group	*M. fortuitum, M. peregrinum, M. senegalense, M. setense, M. conceptionense*, third biovariant complex (*M. houstonense, M. brisbanense, M. mageritense, M. septicum, M. porcinum, M. bonickei, M. neworleansense)*
M. chelonae abscessus group	*M. chelonae, M. abscessus, M. immunogenum, M. bolletii, M. massiliense*
M. smegmatis group	*M. smegmatis, M. goodii, M. wolinsky*
M. mucogenicum group	*M. mucogenicum, M. aubagnense, M. phocaicum*
Recently described fifth group	*M. flavescens, M. neoaurum, M. vaccae, M. phlei, M. thermoresistible, M. canariasense, M. cosmeticum, M. monacense, M. psychrotolerans*

Table 4: RGM by their most common site of infection

Skin and soft tissue	*M. fortuitum* (localized), *M. abscessus* (disseminated)
Pulmonary	*M. abscessus*
Healthcare-associated	*M. fortuitum*
Catheter related blood stream infection	*M. fortuitum*
Bone and joint	*M. fortuitum*
Central nervous system	*M. fortuitum*
Corneal	*M. fortuitum* and *M. chelonae abscessus* group
Ear	*M. abscessus*

American Thoracic Society (ATS) and Infectious Disease Society of America (IDSA) criteria require clinical symptoms, an abnormal chest radiograph, three or more sputum samples, and exclusion of other disorders (Table 5).[1,4] Specimens should be inoculated in both liquid and solid media; biochemical, chromatographic, and molecular techniques can be used for the identification of different species.[1]

First line treatment for *M. tuberculosis* is not active against RGM. The usual duration of antibiotic therapy is four to six months but has been extended up to 12 months. *M. fortuitum* is usually sensitive to amikacin, ciprofloxacin, imipenem, and clarithromycin; resistance to cephalosporins, tetracyclines, and macrolides has been reported. There are no guidelines recommending specific treatment, but usually double or triple antibiotic coverage is used.[5,6]

Table 5: Summary of the ATS/IDSA diagnostic criteria for pulmonary nontuberculous mycobacterial infection

Clinical
1. Pulmonary symptoms, nodular or cavitary opacities on chest radiograph, or high-resolution computed tomographic scan that shows multifocal bronchiectasis with multiple small nodules
and
2. Appropriate exclusion of other diagnoses
Microbiologic
1. Positive culture results from at least two separate expectorated sputum samples (If the results from the initial sputum samples are nondiagnostic, consider repeat sputum acid-fast bacillus [AFB] smears and cultures)
or
2. Positive culture results from at least one bronchial wash or lavage
or
3. Transbronchial or other lung biopsy with mycobacterial histopathological features (granulomatous inflammation or AFB) and positive culture for NTM or biopsy showing mycobacterial histopathological features (granulomatous inflammation or AFB) and one or more sputum or bronchial washings that are culture positive for NTM
4. Expert consultation should be obtained when NTM are recovered that are either infrequently encountered or that usually represent environmental contamination
5. Patients who are suspected of having NTM lung disease but who do not meet the diagnostic criteria should be followed until the diagnosis is firmly established or excluded
6. Making the diagnosis of NTM lung disease does not, per se, necessitate the institution of therapy, which is a decision based on potential risks and benefits of therapy for individual patients

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