CASE SERIES

Peritonitis due to uncommon gram-positive pathogens in children undergoing peritoneal dialysis

Dotis J, Printza N, Papachristou F

1st Department of Pediatrics, Aristotle University, Hippokratio Hospital, Thessaloniki, Greece

Abstract

Peritonitis is still the main complication of peritoneal dialysis (PD) in children. Staphylococcus, especially Staphylococcus epidermidis and Staphylococcus aureus, are the predominant species isolated, followed by Streptococcus spp. and by far by gram-negative bacteria and fungi. We describe three cases of PD-related peritonitis in pediatric patients due to uncommon gram-positive pathogens, which were treated with intraperitoneal antibiotic agents. Hippokratia 2012; 16 (3): 267-268

Key words: peritonitis, peritoneal dialysis, uncommon gram-positive pathogens

Corresponding author: John Dotis , First Department of Pediatrics, Hippokratio Hospital, Konstantinoupoleos 49, Thessaloniki 546 42, Greece,Tel : +30 2310892466, Fax: +30 2310992784, e-mail: yan_dot@yahoo.com

Peritonitis constitutes a significant cause of morbidity in children on peritoneal dialysis (PD). Most of cases are due to gram-positive micro-organisms, especially Staphylococcus spp. and then Streptococcus spp.[1,2]. With the following report, we present three peritonitis cases in two pediatric automated PD (APD) patients due to uncommon gram-positive micro-organisms, including *Kocuria rosea, Corynebacterium spp.* and Staphylococcus capitis, successfully managed with intraperitoneal antibiotics and no need of catheter removal.

Case 1

An 8-year-old immunocompetent girl with end stage renal disease (ESRD) due to dysplastic kidneys was treated with APD. The patient remained well, until one year later, when she developed signs and symptoms consistent with peritonitis such as cloudy peritoneal effluent and low grade fever (38°C) for 8 h. Her PD effluent white cell count was 1,170 cells/μL with 88% neutrophils. Signs of PD catheter exit-site infection were not observed and no cutaneous lesions were evident. After PD fluid and blood cultures were obtained, the APD program was changed to continuous ambulatory PD (CAPD) temporarily and she was empirically treated by intraperitoneal vancomycin (30 mg/L) plus ceftazidime (125 mg/L) in all bags, while cultures were pending and 72 hours later the PD fluid was clear. Culture results were delayed for more than 1 week because of specialized growing requirements of the culprit organism. Finally, it was identified as *K. rosea* by an API Staph system (BioMérieux, Marcy l'Etoile, France) and by conventional tests. Antibiotic sensitivity test revealed oxacillin, erythromycin, clindamycin, ciprofloxacin, trimethoprim/sulfamethoxazole, vancomycin and linezolid sensitivity. Vancomycin was continued for a total of 14 days, while ceftazidime was discontinued. Throughout the peritonitis course, CAPD was continued without ultrafiltration problems.

Case 2

A 6-year old girl who had ESRD due to hemolytic uremic syndrome and was treated with APD, presented with cloudy effluent after about 2 years of dialysis initiation. The PD fluid was sent for microbiological investigations and she was given empirically intraperitoneal vancomycin (30 mg/L) plus ceftazidime (125 mg/L) in all bags. The PD fluid white cell count was 350 cells/μL with 74% neutrophils. There was no infection at the exit site and tunnel of the Tenckhoff catheter. Within 48 hours, PD fluid was clear and cell count was 0/μL. The culture report suggested Corynebacterium spp. as the causative organism, sensitive to amikacin, amoxicillin/clavulanic acid, ceftazidime and vancomycin. *Corynebacterium specie* identification could not be achieved by the microbiology laboratory department. Treatment with intraperitoneal vancomycin plus ceftazidime was continued for a total of 14 days and the patient responded favorably. However, on day 20, the dialysate was again cloudy with a white cell count of 2,000 cells/μL and 75% neutrophils. Adapter of the catheter was removed and sent for culture. *Corynebacterium spp.* was isolated again by both PD fluid and adapter. Unfortunately, no specie identification was available by the microbiology laboratory. The strain sensitivity was the same with the previous isolated strain. Specifically, it was sensitive to amikacin, amoxicillin/clavulanic acid, ceftazidime and vancomycin. Within 72 hours PD fluid was clear and no catheter removal was needed. Intraperitoneal vancomycin (30 mg/L) plus ceftazidime (125 mg/L) was continued for a total of 21 days because of the relapsing peritonitis episode. During

peritonitis the APD program was changed to CAPD temporarily and in the end of peritonitis episodes switched again to APD. Throughout both of peritonitis courses, PD was continued without ultrafiltration problems.

Case 3

The patient that was presented in case 2, after about 2 months of her last peritonitis episode due to *Corynebacterium spp.,* complained for abdominal pain and cloudy effluent, and was brought in for consultation. The PD fluid was slightly opalescent, with 3,000 cells/μL and 59% neutrophils. Gram-positive micro-organism were detected in PD, while, peripheral blood showed 14,220 leukocytes/μL, with 61% neutrophils. She was empirically treated by intraperitoneal vancomycin (30 mg/L) plus ceftazidime (125 mg/L) in all bags and the effluent became clear within 5 days of treatment. In addition, the APD program was changed to CAPD temporarily. PD fluid culture showed a coagulase-negative staphylococci (CoNS), S. capitis, sensitive to cloxacillin, amoxicillin/clavulanic acid, erythromycin, clindamycin, vancomycin, linezolid and resistant to amoxicillin. Organism identification was done by a VITEK system (BioMérieux, Marcy l'Etoile, France) and by conventional tests. Intraperitoneal vancomycin plus ceftazidime were discontinued and intraperitoneal cloxacillin was initiated (125 mg/L). Therapy continued for a total of 14 days and patient recovered well with the absence of any peritonitis signs. No ultrafiltration problems have been observed throughout the peritonitis episode.

Discussion

Despite the wide acceptability of PD as a dialytic modality of choice for pediatric patients, peritonitis remains one of the most common causes of morbidity and treatment failure in such patients. The reported annual rate of PD-related peritonitis in children is 0.68–0.86 episodes per patient-year or 1 episode every 13.9–28.6 patient-months[1]. The most common causes are gram-positive microorganisms, with a predominance of *Staphyloccus spp.* and *Streptococcus spp.* These two accounted for more than 70% of all primary peritonitis episodes[1,2]. With this report we described three PD-related peritonitis episodes in two pediatric patients caused by unusual microorganisms: *K. rosea, Corynebacterium spp.* and *S. capitis*.

Kocuria spp. are gram-positive, coagulase-negative, coccoid actinobacteria, strictly aerobic, members of the Micrococcaceae family and generally considered as non-pathogenic saprophytes of skin, mucosa and oropharynx. *Kocuria spp.* were previously classified into the genus Micrococcus but after a taxonomic revision, some strains were reclassified in the new genus Kocuria[3]. *K. rosea* constitutes one of more than 11 species of Kocuria which were recognized, and is rarely reported as a human pathogen. Systemic infection due to K. rosea is uncommon, but there have been a few recent reports describing the association of K. rosea with intravenous catheters and CAPD[4].

Corynebacterium spp. is a genus of gram-positive, anaerobic, non-motile, irregularly shaped rods that constitute part of the normal skin flora. In the past Corynebacterium spp. was thought to have little pathogenic role in humans, however recently, a wide spectrum of disease has been described, including endocarditis, meningitis, pulmonary infiltrates, soft tissue infections, device-related nosocomial infections, urinary tract infections and septicemia[5]. *Corynebacterium spp.,* account for about 2% of all PD-related peritonitis episodes in adults[5,6]. However, in children incidence of *Corynebacterium spp.* peritonitis has not been well established. In an adults study was found that recurrent Corynebacterium peritonitis was common after a 2-week course of intraperitoneally administered antibiotics[6]. This could explain the relapse of *Corynebacterium spp.* peritonitis in case 2 despite the 2-week treatment. However, although the relapse of peritonitis in our patient, we decided not to change the catheter because we had an excellent treatment response (48 hours), the PD continued without ultrafiltration problems and we had a gram-positive organism.

S. capitis is a subtype of CoNS that is characteristically novobiocin-sensitive, aerobic, hemolysis-positive with low adhesion ability to foreign body surfaces in contrast to other CoNS. S capitis, forms part of the normal microflora of the human scalp, face, neck, and ears but is rarely recognised as causing peritonitis[7]. CoNS peritonitis is due primarily to touch contamination, is generally a mild form of peritonitis and responds readily to antibiotic therapy, but can sometimes lead to relapsing peritonitis due to biofilm involvement[8].

In conclusion, although these organisms are usually considered to be contaminants they can cause symptomatic peritonitis. For that reason, it is important to view these organisms as pathogens rather than contaminants when isolated in children with peritonitis. Microbiological antibiotic testing should always be sought and children should be treated accordingly.

References

1. Chadha V, Schaefer FS, Warady BA. Dialysis-associated peritonitis in children. Pediatr Nephrol. 2010; 25:425-440.
2. Li PK, Szeto CC, Piraino B, Bernardini J, Figueiredo AE, Gupta A, et al. Peritoneal dialysis-related infections recommendations: 2010 update. Perit Dial Int. 2010; 30:393-423.
3. Savini V, Catavitello C, Masciarelli G, Astolfi D, Balbinot A, Bianco A, et al. Drug sensitivity and clinical impact of members of the genus Kocuria. J Med Microbiol. 2010; 59:1395-1402.
4. Kaya KE, Kurtoglu Y, Cesur S, Bulut C, Kinikli S, Irmak H, et al. Peritonitis due to Kocuria rosea in a continuous ambulatory peritoneal dialysis case. Mikrobiyol Bul. 2009; 43:335-337.
5. Barraclough K, Hawley CM, McDonald SP, Brown FG, Rosman JB, Wiggins KJ, et al. Corynebacterium peritonitis in Australian peritoneal dialysis patients: predictors, treatment and outcomes in 82 cases. Nephrol Dial Transplant. 2009; 24:3834-3839.
6. Szeto CC, Chow KM, Chung KY, Kwan BC, Leung CB, Li PK. The clinical course of peritoneal dialysis-related peritonitis caused by Corynebacterium species. Nephrol Dial Transplant. 2005; 20:2793-2796.
7. Shin JH, Kim SH, Jeong HS, Oh SH, Kim HR, Lee JN, et al. Identification of coagulase-negative staphylococci isolated from continuous ambulatory peritoneal dialysis fluid using 16S ribosomal RNA, tuf, and SodA gene sequencing. Perit Dial Int. 2011; 31:340-346.
8. Fahim M, Hawley CM, McDonald SP, Brown FG, Rosman JB, Wiggins KJ, et al. Coagulase-negative staphylococcal peritonitis in Australian peritoneal dialysis patients: predictors, treatment and outcomes in 936 cases. Nephrol Dial Transplant. 2010; 25:3386-3392.