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Case report

Rare Coagulase Negative Staphylococci May Cause Peritoneal Catheter Loss

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Abstract

Introduction. Members of *coagulase negative staphylococci* family (CNS) may cause peritonitis frequently in CAPD patients. *Staphylococcus lugdunensis* and *Staphylococcus warnerii* are members of this family. They are generally believed to be easily treated based upon having lower virulence. However, they may cause severe peritonitis resulting in technique failure.
Case presentation. We present 3 CAPD patients suffering from peritonitis. The first patient presented with two peritonitis episodes. The organism was isolated as *Staphylococcus Lugdunensis*. The second patient presented with *Staphylococcus Warnerii* peritonitis but could be treated successfully. The third patient presented with three peritonitis episodes arising from *Staphylococcus Warnerii.* The infection could be controlled by antibiotherapy only in one of our patients. The other patients lost their peritoneal catheter.
Conclusions. *S. Warneri* and *S.Lugdunensis* are known to have the ability to form biofilm over peritoneal catheters. Two of our patients infected with these bacteria were transferred to hemodialysis. Hence, these bacteria should be accepted as having the potential to cause technique failure if they are ignored.

Keywords: peritoneal dialysis, peritonitis, technique failure

Introduction

Peritonitis is a common complication of peritoneal dialysis. It may cause peritoneal fibrosis, ineffective dialysis and catheter loss. It may also cause death if arising from antibiotic resistant organisms. Diagnosing the offender agent rapidly and starting proper antibiotics is crucial. We had 2 uncommon organisms isolated from peritoneal cultures of 3 peritonitis patients recently.
Dialysis fluid samples were aspirated by our specialist continuous ambulatory peritoneal dialysis (CAPD) nurse by an aseptic technique and delivered to our microbiological laboratory in 30 minutes. Leukocyte count was performed by Nageotte Brightline hemacytometer. Giemsa and Gram staining were performed to the dialysate specimencs. Approximately 5 cc dialysate was inoculated in a BACTEC BacT/ALERT (BIOMERIEUX, INC. Durham) and %5 sheep blood and Eosin-Methylene blue agar. After 24 hours of inoculation cultures were controlled. Identifications were determined using the Vitek2 system (bioMeriux SA, France).

Case report 1

A 56-year-old female had end-stage renal disease (ESRD) due to chronic tubulo-interstititial nephritis. She was on CAPD for twelve months. She was admitted to our clinic with decreased ultrafiltration of 3 days. There were 19200/mm^3 leukocytes, %90 as polymorphonuclear leukocytes (PNL) in the peritoneal fluid sample. Her leukocyte count was 5850/mm^3, 64% as PNL on hemogram. Serum CRP was 54 mg/L. Cefazolin and ceftazidime antibiotherapy was started empirically. *S. Lugdunensis* was isolated from the peritoneal culture on the 3th day. Ceftazidime was stopped as it was sensitive to methicllin. The peritoneal leukocyte number was 40/mm^3 and CRP value was 22 mg/L on the 3th day. The following peritoneal fluid cultures were negative. The antibiotherapy was stopped on the 14th day.
She was admitted again with abdominal pain and fatique after trouble-free 4 months. No rebound tenderness was present. She had recognized that her peritoneal effluent was cloudy for 2 days. 1320 leukocytes were detected on peritoneal fluid leukocyte count. 90% of the leukocytes was PNL. Her leukocyte count was 5850/mm^3, 64% as PNL on hemogram. Serum CRP was 77 mg/L. Emprical cefazolin and ceftazidime was introduced. Once again *S. Lugdunensis* was isolated from the peritoneal culture. It was methicillin-sensitive. Ceftazidime was stopped. Catheter wipe sample culture was obtained on

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the 2nd day. *S.lugdunensis* was identified also on this specimen. There were no concomitant dermal infections as an additional risk factor. In addition, any exit-site or tunnel infection was not detected with serial and detailed examinations. Her peritoneal fluid leukocyte count was 160/mm^3 and CRP was 4 mg/L on the 3th day. Cefazolin monotherapy ensured healing succesfully with 12/mm^3 peritoneal fluid PNL on the 14th day. The following cultures were negative. Peritoneal catheter was removed because of obstruction with fibrinous material leading to ultrafiltration failure 2 months later.

Case report 2

A 57-year-old man was on CAPD due to ESRD for 3 years. He was admitted with abdominal pain, nausea and vomiting of 2 days. His peritoneal dialysis fluid was cloudy. Microscopic examination of the fluid showed 2240/mm^3 leukocytes, 90% as PNL. His leukocyte count was 11460/mm^3, 79% as PNL on hemogram. Serum CRP was 72 mg/L. Cefazolin and ceftazidime was introduced emprically. *S. Warnerii* was isolated from the peritoneal fluid culture on the 2nd day. The fluid culture that was inseminated into the blood culture bottle was also positive for *S.Lugdunensis*. As a result this organism was accepted as the offender agent. Ceftazidime was stopped because the detected organism was methicillin-sensitive. No concomitant dermal infection, exit-site or tunnel infection were detected as additional risk factors. The following cultures were negative. CRP fell to 8 mg/L and peritoneal leukocyte count fell to 24/mm^3 on the 6th day. He was cured completely on the 10th day.

Case report 3

A 43-year-old male was on CAPD for 6 years. He had ESRD secondary to hypertension. He was admitted to our clinic with cloudy peritoneal fluid of 1 week. There were 2400/mm^3 leukocytes, %90 as PNL in the peritoneal fluid. Serum CRP was 64 g/L. His leukocyte count was 7200/mm^3, 62% as PNL on hemogram. Cefazolin and ceftazidime was introduced empirically. Peritoneal culture was negative. The peritoneal leukocyte count fell to 48/mm3 on the 3rd day. The last peritoneal leukocyte count was 4/mm^3 and CRP value was 3.3 g/L on the 10th day. As a result, the antibiotherapy was stopped.
He was admitted with intermittent cloudy peritoneal fluid after trouble-free 2 months. He described intermittent cloudy peritoneal fluid after his last discharge from the hospital. On microscopic examination, there were 560/mm^3 leukocytes, %90 as PNL. Serum CRP was 11 mg/L. Emprical piperacillin-tazobactam was started for its anti-pseudomonal efficiency, as he had recent hospitalization history. Culture results were negative the first days. Then liquid nutrient broth was used and we were able to detect the organism. The organism that grew on peritoneal fluid culture was methicillin-sensitive *S. Warnerii*. It was accepted as the culprit organism. Peritonitis was treated succesfully with piperacillin-tazobactam monotherapy. Peritoneal leukocyte count was 16/mm^3 and CRP value was 9 mg/L on the 6th day. The following peritoneal fluid cultures were negative. Antibiotherapy was stopped on the 14th day.
He was called for cadaveric renal transplanatation as the first patient of the waiting list 5 months later. He had no complaints. Nevertheless, he declared intermittent cloudy peritoneal fluid occasionally after his 2nd peritonitis treatment. Microscopic examination of the fluid revealed 680/mm^3 leukocytes, 80% as PNL. Serum CRP was 20 mg/L. Leukocyte count was 6800/mm^3, 63% as PNL on hemogram. He was started to empirical cefazolin and ceftazidim antibiotherapy. Dermal infection, exit-site or tunnel infection were not detected. The catheter was removed because of biofilm formation doubt. Leukocyte count fell to 12/mm^3 on the 5th day. No organisms were isolated from the peritoneal fluid and the catheter culture.

Discussion

Peritonitis episodes are destructive for peritoneal membranes of CAPD patients. Prompt isolation of the offending organism is crucial for proper antibiotic selection. Empiric therapy must be changed with compatible antibiotics according to the antibiogram. Clinicians must regard rare organisms even if some of them are accepted to have lower virulence for peritonitis. As patient inadaptibility and unawareness may still be responsible factors, the patients must be educated about peritonitis and asepsis techniques periodically. Our patients are educated regularly at their monthly visits.
The most common peritonitis agents in CAPD patients are CNS. *S. epidermidis* is predominant among members of this family. Peritonitis of CNS usually has a milder course when compared to *Staphylococcus Aureus*. Treatment is generally easier and catheter loss is rare [1,2]. In addition to frequent organisms, peritoneal dialysis patients are also under threat of rare organisms like skin commensals that are commonly presumed as non-pathogenic. However, data comparing the outcome of peritonitis caused by different CNS species are inadequate. *S. Lugdunensis* is a member of CNS. It is generally accepted as a skin commensal with low virulence. But it can occasionally be isolated from skin and soft tissue infections. Despite the belief that it is less infective, *S. lugdunensis* has been reported to have a more severe course than other CNS species when isolated. It resembles *S. Aureus* from this point on [3,4]. Seong-Ho *et al*. also showed that *S. Lugdunensis* may cause serious infections like sepsis. Importantly, catheters were the most common entrance sites for hospital-acquired bacteremia in their trial [5].
S. Lugdunensis have been reported very infrequently as a peritonitis agent in the literature. We could find a

peritonitis case series of Ludlam *et al*., with 3 *S. lugdunensis* isolates from 106 episodes [6]. Unfortunately, there were no pieces of information about clinical findings, antibiotherapy and outcome of those patients with *S. Lugdunensis*. They also did not mention about catheher survival. One rare available informative S. Lugdunensis peritonitis case was reported by Schnitzler *et al*. Catheter exit and tunnel infection with a deep abscess was accompanied with peritonitis, in which intraperitoneal vancomycin had no effect. That episode resulted in catheter loss [7]. In our first patient, we isolated *S. Lugdunensis* from the peritoneal fluid during her first episode. It was not accepted as the culprit agent initially because of being a skin member with low virulence. Culture result was thought as contamination. On the second episode, *S. Lugdunenesis* was identified again. The antibiogram result was the same with the first episode. Catheter was saved owing to successful antibiotherapy. Unfortunately, the catheter was removed as a result of dysfunction 2 months later. Catheter culture was negative in our patient. This may be a result of the removal during antibiotherapy.

S. Warnerii is another CNS and a commensal of the epithelial flora and mucosal membranes. It represents nearly 1% of the skin *staphylococci* [10]. It has occasionally been reported to cause severe infections like endocarditis, hematogenous vertebral osteomyelitis and ventriculoperitoneal shunt-related meningitis [8-10]. Besides, Kamath *et al*. described *S.warnerii* as an important nosocomial pathogen, particularly in catheter-related infections. Most of their patients with catheter-related bacteremia suffered from underlying immunosuppressive illnesses [11]. Biofilm formation may be the cause of the catheter-related infections in those patients. Unfortunately, no data could be obtained on this issue.

S. Warnerii was rarely reported to cause peritonitis. Camargo *et al.* isolated *S. Warnerii* in only 7% of peritonitis episodes in the CAPD patients [12]. In another review, CAPD patients were followed for 15 years. Only 1 of 93 peritonitis agents was *S.Warneri* in this trial [13]. The worst part was the absence of any data about the outcomes including catheter survival. Our first *S. Warneri* peritonitis patient was managed successfully with standard antibiotherapy and peritoneal catheter was saved. But the second patient had a poor response to treatment leading to catheter loss.

In our patients, accompanying dermal infections were examined carefully before catheter placement. Additionally, proper surgical techniques were performed during catheter placement in order to prevent infectious complications. No exit-site or tunnel infections were detected by serial and detailed examinations. There were no accompanying dermal infections as additional risk factors in our patients unlike patients in the study of Schnitzler *et al*. [7]. Our patients were re-educated after their first peritonitis episodes against these skin commensals. Even so, the infections with the same organisms recurred. We think that as chronic renal failure itself is an immunsuppressive condition and as peritoneal dialysis requires an indwelling catheter that breaks the skin barrier protecting the underlying structures, the pathogenicity of these skin commensals may increase. Furthermore, the ability of *S. Warneri* and *S.Lugdunensis* to form biofilm over peritoneal catheters may behave as an additional risk factor.

Conclusion

In conclusion, this case report shows that *S. Lugdunensis* and *S. Warneri* may result in recurrent peritonitis episodes and resultant catheter loss. In addition, clinicians must be more eager to accept them as potential peritonitis agents in order to improve the outcomes.

Conflict of interest statement. None declared.

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