Incidence and Clinical Presentations of Eosinophilic Peritonitis in Continuous Ambulatory Peritoneal Dialysis Patients: Experience in a Medical Center

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Abstract

BACKGROUND. Although peritonitis is commonly caused by microorganism, eosinophilic peritonitis was reportedly in 1980s. Whether eosinophilic peritonitis has significant effect on continuous ambulatory peritoneal dialysis (CAPD) patients remains unknown. In this study, we investigated the prevalence and clinical presentations of eosinophilic peritonitis in CAPD patients with first episode of peritonitis.

METHODS. Retrospectively, 144 of 428 CAPD patients in our hospital with first episode of peritonitis from Jan, 1999 to April, 2007 were enrolled for analysis.

RESULTS. Among the 144 CAPD patients with first episode of peritonitis, there are 105 cases (72.92%) of bacterial peritonitis (including 64 cases with Gram positive bacteria, 34 cases with Gram negative bacteria, and 7 cases with mixed bacteria cultured), 1 (0.69%) tuberculosis bacteria peritonitis, 2 (1.39%) fungus peritonitis and 36 (25%) sterile peritonitis. Four of these 144 cases (2.78%) of peritonitis are eosinophilic peritonitis. The duration from initiation of CAPD to first peritonitis, abdominal pain, and dialysate white blood cell count is significantly shorter in the group of eosinophilic peritonitis. Hence, duration from initiation of CAPD to first peritonitis, abdominal pain and eosinophil count in dialysate may be a good parameter for differential diagnosis from non-eosinophilic peritonitis. Medication may not be helpful for asymptomatic eosinophilic peritonitis.

CONCLUSION. Patients with eosinophilic peritonitis are usually asymptomatic except for increased dialysate white blood cell count. The clinical course is generally benign. (Acta Nephrologica 2011; 25: 22-25)

KEY WORDS: continuous ambulatory peritoneal dialysis, eosinophilic peritonitis, sterile peritonitis

Introduction

Continuous ambulatory peritoneal dialysis (CAPD) is a worldwide treatment for end stage renal disease (ESRD) patients. Advantages of CAPD are avoidance of heparinization and vascular surgery and a slower clearance rate. It is helpful for some cardiovascular patients with refractory congestive heart failure. However, peritonitis is a common complication of CAPD (1). It is usually caused by poor technique, exit-site infection (2, 3), tunnel infection (4, 5), perforation of hollow viscera (6), diverticulitis (7), pancreatic abscess (8), and lesser sac abscess (9).

Peritonitis is commonly caused by microorganism, and aseptic peritonitis such as eosinophilic peritonitis was first reported in 1967 (10). The incidence
of eosinophilic peritonitis was reportedly as high as 60% in the 1980s, but dropped dramatically to 9% after the 1980s (11-13). Whether eosinophilic peritonitis has significant effect on CAPD patients remains unknown. In this study, we investigated the prevalence and clinical presentations of eosinophilic peritonitis in CAPD patients with first episode of peritonitis.

**Methods**

Of 428 CAPD patients with first episode of peritonitis from Jan, 1999 to April, 2007, 144 were enrolled for analysis in this study. Peritonitis was defined as turbid dialysate and more than 100 leukocytes /mm³ in dialysate. Sterile peritonitis was defined as peritonitis without evident culture growth. Eosinophilic peritonitis was defined as sterile peritonitis and > 10% eosinophils in the differential cell count of dialysate. We examined the dialysate by Gram’s stain as well as placing into blood culture, which was analyzed by BacT/Alert automated blood culture system. Duration from initiation of CAPD to first peritonitis and duration from first peritonitis to remission were recorded separately. Patients’ characteristics such as age, gender, cause of ESRD and initial presentations, such as abdominal pain and fever, were also studied.

**Statistics**

The collected data were analyzed with SPSS for Windows release 13.0. Because of the small sample size in Group A, Wilcoxon rank-sum test, a nonparametric statistical method which makes fewer assumptions about the distribution shape, was used. Fisher’s exact test was conducted to examine the difference among peritonitis groups using the ranks of individual observations rather than their actual values. A P-value < 0.05 indicated statistical significance.

**Results**

Among the 144 CAPD patients with first episode of peritonitis, there are 105 cases (72.92%) of bacterial peritonitis (including 64 cases with Gram positive bacteria, 34 cases with Gram negative bacteria and 7 cases with mixed bacteria cultured), 1 tuberculosis bacteria (0.69%) peritonitis, 2 fungus (1.39%) peritonitis and 36 sterile (25%) peritonitis (Fig. 1). Four of these 144 cases (2.78%) of peritonitis are eosinophilic peritonitis.

![Fig. 1. Culture results of 144 CAPD patients with first episode of peritonitis.](image)

The negative rate of dialysate culture in our center was around 22.6% during the study period. The false negative culture might be attributed to inadequate sample collection, lab error and atypical infection such as virus and fungus. Although the etiology of eosinophilic peritonitis remained unclear, it was postulated to be allergic reaction to the material of the catheter or dialysate bags. In this study, there are only 2.78% CAPD patients with first peritonitis suffering from eosinophilic peritonitis. Reasons of this low incidence dialysate white blood cell count is significantly shorter in the group of eosinophilic peritonitis (Table 1).

Comparison between the eosinophilic and non-eosinophilic peritonitis of the patients with sterile peritonitis shows that the prevalence of eosinophilic peritonitis is about 11.1% (4/36). There were no significant difference in parameters such as sex, fever, CAPD catheter removal and mortality between the groups of eosinophilic peritonitis and non-eosinophilic peritonitis of the patients with sterile peritonitis. Patients with eosinophilic peritonitis are of significantly younger age. Duration from initiation of CAPD to first peritonitis, abdominal pain, and dialysate white blood cell count is significantly less, but duration from first peritonitis to remission is significantly longer in the group of eosinophilic peritonitis (Table 2).

One patient with sterile eosinophilic peritonitis was treated with oral prednisolone for 20 days, but the eosinophil count still exceeded 100/mm³ in dialysate for another 659 days. Another patient was treated only with intraperitoneal cefazolin 4 times a day for 7 days, and the peritonitis remitted on the 49th day. The other two patients did not receive any prednisolone or antibiotic treatment, the eosinophil count in dialysate was decreased in 4 days and 43 days, respectively. All the 4 cases had complete remission.

**Discussion**

The negative rate of dialysate culture in our center was around 22.6% during the study period. The false negative culture might be attributed to inadequate sample collection, lab error and atypical infection such as virus and fungus. Although the etiology of eosinophilic peritonitis remained unclear, it was postulated to be allergic reaction to the material of the catheter or dialysate bags. In this study, there are only 2.78% CAPD patients with first peritonitis suffering from eosinophilic peritonitis. Reasons of this low incidence
rate are suggested as follows. First, most previous reports come from western society. Ethnical difference cannot be ruled out. Second, this asymptomatic, benign disease may go unnoticed by clinical physicians, nursing stuff or even the patients themselves. Finally, the improved plastics or plasticizers in the catheter or dialysate bags may play an important role in reducing noxious stimuli and allergic reaction to the peritoneal dialysis system for eosinophilic peritonitis.

In our study, the mean duration from initiation of CAPD to first peritonitis date was 13 days in the eosinophilic group compared with 736 days in the non-eosinophilic one. All the cases of sterile eosinophilic peritonitis occurred within the first 2 months (Table 1), which was compatible with previous finding. Sterile eosinophilic peritonitis usually occurs within the first 3 months after initiation of dialysis (11). Our study also supports that sterile eosinophilic peritonitis is usually a benign process, resolves spontaneously after a period of up to several months of continued dialysis (13). Unlike persistent infective peritonitis, catheter removal is not indicated. No patient with sterile eosinophilic peritonitis die afterwards (13). In contrast to the high incidence (71.9-81.4%) of abdominal pain in non-eosinophilic peritonitis patients, there is no patient with eosinophilic peritonitis suffering from abdominal pain (Tables 1 and 2). Therefore, duration from initiation of CAPD to first peritonitis, abdominal pain and eosinophil count in dialysate can be considered as a good parameter for differential diagnosis of sterile eosinophilic peritonitis from non-eosinophilic peritonitis in patients with first peritonitis.

Although 2-3 weeks of empirical antibiotics are usually prescribed for bacterial peritonitis and non-eosinophilic peritonitis, a short course of antibiotics is sometimes prescribed to the patients with eosinophilic peritonitis before eosinophil count in dialysate can be obtained. Short courses of therapy with steroid, diphenhydramine, or ketotifen have been reported to be of benefit to chronic symptomatic eosinophilic peritonitis.

### Table 1. Clinical presentations of non-eosinophilic peritonitis and eosinophilic peritonitis

<table>
<thead>
<tr>
<th></th>
<th>Non-eosinophilic peritonitis (n = 140)</th>
<th>Eosinophilic peritonitis (n = 4)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>54.3 ± 15.4</td>
<td>46.3 ± 10.6</td>
<td>0.271</td>
</tr>
<tr>
<td>Male (%)</td>
<td>65 (46.4)</td>
<td>3 (75.0)</td>
<td>0.344</td>
</tr>
<tr>
<td>Duration from initiation of CAPD to first peritonitis (days)</td>
<td>736 ± 1034</td>
<td>13 ± 19</td>
<td>0.001</td>
</tr>
<tr>
<td>Duration from first peritonitis to remission (days)</td>
<td>18 ± 11</td>
<td>194 ± 324</td>
<td>0.094</td>
</tr>
<tr>
<td>Abdominal pain (%)</td>
<td>114 (81.4)</td>
<td>0 (0)</td>
<td>0.004</td>
</tr>
<tr>
<td>Fever (%)</td>
<td>56 (40.0)</td>
<td>0 (0)</td>
<td>0.157</td>
</tr>
<tr>
<td>Dialysate WBC count</td>
<td>3506.1 ± 4947</td>
<td>395.3 ± 258.2</td>
<td>0.023</td>
</tr>
<tr>
<td>CAPD catheter removal (%)</td>
<td>7 (5)</td>
<td>0 (0)</td>
<td>1.0</td>
</tr>
<tr>
<td>Mortality (%)</td>
<td>2 (1.4)</td>
<td>0 (0)</td>
<td>1.0</td>
</tr>
</tbody>
</table>

### Table 2. Clinical presentations of non-eosinophilic peritonitis and eosinophilic peritonitis in patients with sterile peritonitis

<table>
<thead>
<tr>
<th></th>
<th>Sterile non-eosinophilic peritonitis (n = 32)</th>
<th>Sterile eosinophilic peritonitis (n = 4)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>48.3 ± 16.1</td>
<td>46.3 ± 10.6</td>
<td>0.03</td>
</tr>
<tr>
<td>Male (%)</td>
<td>13 (40.6)</td>
<td>3 (75.0)</td>
<td>0.303</td>
</tr>
<tr>
<td>Duration from initiation of CAPD to first peritonitis (days)</td>
<td>780 ± 1210</td>
<td>13 ± 19</td>
<td>0.005</td>
</tr>
<tr>
<td>Duration from first peritonitis to remission (days)</td>
<td>14 ± 6</td>
<td>194 ± 324</td>
<td>0.003</td>
</tr>
<tr>
<td>Abdominal pain (%)</td>
<td>23 (71.9)</td>
<td>0 (0)</td>
<td>0.012</td>
</tr>
<tr>
<td>Fever (%)</td>
<td>10 (31.3)</td>
<td>0 (0)</td>
<td>0.559</td>
</tr>
<tr>
<td>Dialysate WBC count</td>
<td>2430.4 ± 3262.1</td>
<td>395.3 ± 258.2</td>
<td>0.019</td>
</tr>
<tr>
<td>CAPD catheter removal (%)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>1.0</td>
</tr>
<tr>
<td>Mortality (%)</td>
<td>1 (3.1)</td>
<td>0 (0)</td>
<td>1.0</td>
</tr>
</tbody>
</table>
Eosinophilic Peritonitis in PD Patients

Interestingly, antibiotics and steroid seem to have no influence on the course of the 2 cases of eosinophilic peritonitis. It may be related to the asymptomatic eosinophilic peritonitis in our study. Although the duration from first peritonitis to remission is longer than in noneosinophilic peritonitis and sterile non-eosinophilic peritonitis (194 days versus 18 days and 14 days, respectively), sterile eosinophilic peritonitis is self-limited and has a benign prognosis. Empirical antibiotics are not always prescribed for all the patients.

This study certainly has some limitations. First, it is retrospective in nature, and any conclusions should be interpreted as exploratory in nature. Second, we were limited by the data already collected in the database. Lastly, we were unable to externally validate our findings in a separate data set. Other studies would be needed to corroborate our findings.

In conclusion, sterile eosinophilic peritonitis occurs less commonly today than in the 1980s. The clinical course is generally benign. Besides the eosinophil count in dialysate, duration from initiation of CAPD to first peritonitis and abdominal pain may be a good parameter for differential diagnosis from non-eosinophilic peritonitis. Medication may not be helpful for asymptomatic eosinophilic peritonitis.

Acknowledgments

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References