



## Research Article

# Retrospective Evaluation of Peritonitis Caused by Peritoneal Dialysis in Patients with Chronic Renal Failure

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## Abstract

**Objectives:** To retrospectively evaluate the peritonitis and its peritoneal dialysis related causes in patients with chronic renal failure (CRF) and to identify the causes that are active in the prognosis of peritonitis.

**Methods:** Blood parameters and dialysate fluids of patients who received peritoneal dialysis due to CRF between June 2006 and January 2011 for CRF were evaluated retrospectively.

**Results:** While the most common cause of coagulase negative staphylococci was isolated, it was determined that the most common complaints were abdominal pain and nausea, and the most common examination findings were abdominal tenderness, fever and turbidity. In addition, it was identified that patients with low albumin levels had longer hospitalization periods ( $p=0.04$ ).

**Conclusion:** Peritonitis is still a major cause of mortality and morbidity in peritoneal dialysis patients. Tuberculous and fungal peritonitis should be considered in treatment-resistant cases. Since the prognosis and hospitalization times are longer in patients with low albumin levels, albumin levels are an important parameter in these patients.

**Keywords:** Chronic renal failure, peritonitis

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Chronic renal failure (CRF) is a progressive and irreversible disease of the kidney. The frequency is not exactly known.<sup>[1]</sup> It is staged according to the rate of glomerular filtration (GFR). Patients with GFR less than 15 ml/min are classified as patients with end-stage renal failure. Renal replacement therapies are performed in patients with end-stage renal disease.<sup>[2]</sup> One of the renal replacement therapies is peritoneal dialysis. Peritonitis is the most important cause of mortality and morbidity in peritoneal dialysis. In our study, patients who underwent peritoneal dialysis between 2006 and January 2011 were evaluated retrospectively. To retrospectively evaluate the peritonitis and its peritoneal dialysis related causes in patients with chronic renal failure (CRF) and to identify the causes that are active in the prognosis of peritonitis.

## Methods

112 peritoneal dialysis patients who were enrolled in the peritoneal dialysis unit of 19 Mayıs University Medical Faculty Hospital and 68 peritonitis attacks related to these patients were evaluated retrospectively. Patient information was obtained from files recorded in peritoneal dialysis and from electronic records of the hospital. Patients were divided into groups as inpatients and outpatients, and those who recovered and unrecovered. Age, sex, accompanying comorbid diseases, admission complaints, examination findings, dialysate fluid culture results, dialysate liquid cell count, microscopic staining of patient blood count, serum white blood cell, lymphocyte, neutrophil, albumin and cholesterol levels were examined. The diagnosis of peri-

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tonitis was made if  $\text{mm}^3$  had more than 100 leukocytes and if more than 50% of these leucocytes were neutrophils and/or if microorganisms are isolated in the peritoneal fluid. Chi-square test was used to compare the data obtained from the counts and the statistical significance level was considered to be  $p<0.05$ .

## Results

150 patients who had peritoneal dialysis were screened. Files of 112 patients out of 150 were accessed. 68 of the patients had at least a single peritonitis attack and a total of 121 peritonitis attacks was observed. 36 (52.9%) of the patients were male, while 32 (47.1%) were women. The average age is  $51.2\pm14.3$  (19-77). The most common comorbid diseases are hypertension and diabetes mellitus (Table 1). Factors of 67 (63.4%) attacks could be isolated, while factors of 45 (36.4%) attacks could not be isolated (Table 2). Coagulase negative staphylococci was isolated the most frequently and the most common application complaints of the patients were abdominal pain, nausea, fever and colour change in peritoneal fluids (Table 3). The most common observation was abdominal sensitivity (Table 3). Patients of 71 (57.3%) attacks were treated as inpatients and others were treated as outpatients. 2 cases were diagnosed as tuberculous peritonitis and 8 cases were diagnosed the fungal peritonitis. A single tuberculous peritonitis patient was tested positive for ARB while the other was tested ABS negative and therefore was diagnosed using laparoscopic biopsy. Patients who have recovered and unrecovered and patients who were treated as inpatients and outpatients had statistical differences in where they dwelled, sex and the levels of total protein, cholesterol, dialysate, white blood cell count, neutrophils and lymphocytes. Comparison of treatment and hospital stay durations of the patients revealed that patients who had low albumin levels had longer hospitalization periods and this difference was statistically significant ( $p=0.04$ ).

## Discussion

Peritonitis is still an important cause of mortality and morbidity in patients who undergo peritoneal dialysis.<sup>[3-6]</sup> Similar to the literature on the field, coagulase negative staphylococci was isolated most frequently in our study, however, no factors were isolated in cultures in almost a third of the patients. Previous studies and our has similar rates of isolated from organisms isolated in cultures. The cause of this might be the fact that patients used proflactic antibiotics due their clinical complaints. The culture samples taken after antibiotic usage may be affected to provide negative results in terms of the development of factors.<sup>[7-9]</sup>

**Table 1.** Comorbid Diseases associated With CRF Patients

	Number (n)	Percent (%)
Hypertension	30	44
Diabetes mellitus	13	19
Coronary arter disease	7	10
Bening prostate hypertrophy	3	4.4
Toxic multinoduler goiter	3	4.4
Peripheral vasculer disease	2	3
Chronic obstricutive pulmoner disease	2	3
Heart failure	1	1.5
Rheumatoid arthritis	1	1.5

**Table 2.** Peritoneal fluid culture results

	Number (n)	Percent (%)
Coagulase negative staphylococci	29	23.4
Staphylococcus aureus	9	7.3
Streptococcus mutans	4	3.2
Enterecoccus spp.	3	2.4
E. Coli	9	7.3
Klebsiella spp	2	1.6
Serratia spp.	1	0.8
Pantea	1	0.8
Acinetobacter spp.	3	2.4
m. tuberculosis	2	1.6
Pseudomonas spp.	5	4
Candida alcicans	9	7.3
Negative culture results	45	36.4

**Table 3.** Application of peritonitis attack instant complaint and physical examination findings

	Number (n)	Percent (%)
Abdominal pain	114	91.9
Nausea	47	37.9
Fever	29	23.4
Color change in peritoneal fluid	23	18.8
Anorexia	6	4.8
Weakness	5	4
Abdominal tenderness	85	68.5

Other major mortality and morbidity cause in CRF patients is malnutrition. Malnutrition affects all bodily systems, including the immune system. In end-stage renal disease patients, insufficient energy intake, increase in catabolism, physical inactivity, metabolic acidosis, low energy intake and the use of steroids are the primary causes of malnutrition. While all of these can cause infections, the infection itself can also contribute to malnutrition. Malnutritional changes can be made with various anthropometric measurements. However, one of its most effective biochemical indicators is the blood level of albumin. Due to this, worse

prognoses are expected in patients with low albumin levels. In our study, patients with low albumin levels had longer duration of hospital stays than other patients. Similarly, previous studies have found a relationship between albumin levels and the occurrences of peritonitis attacks.<sup>[10, 11]</sup> Another study has reported that a single unit of decrease in albumin level units had increased the rate of mortality and the duration of hospitalization.<sup>[12]</sup> Our study supports this finding. All these findings support that albumin levels are an important parameter in the course of peritonitis.

Tuberculous peritonitis is less prevalent than bacterial peritonitis, however, its morbidity and mortality rates are higher.<sup>[13]</sup> Another important factor in patients with tuberculous peritonitis is diagnosis. Gold standard in diagnosis is the culture.<sup>[14]</sup> However, culture provides delayed results. This may cause delayed diagnoses in patients who are ARB negative. Therefore, there is a need for other methods for diagnosis. Laparoscopy is one of the methods for early diagnosis in clinically suspected patients. In our study, an ARB negative patient with tuberculous peritonitis was diagnosed using laparoscopy. Other studies in the literature support the consideration of laparoscopy in patients thought to have Tuberculous peritonitis but test negative for ARB.<sup>[13-15]</sup>

Fungal peritonitis also is less prevalent than bacterial peritonitis and it also has important mortality and morbidity implications. Its prevalence is between 2-10%.<sup>[16]</sup> Similarly, our study has observed the rate of 8%. The usage of broad-spectrum antibiotics and floral changes that occur due to the usage of these antibiotics, lower resistance against peritoneal invasions due to previous peritonitis attacks, decreases in complement levels due to decreased opsonization, immunosuppressive conditions caused by uremia, usage of high-glucose content fluids and existence of a foreign object due to sustained usage of catheters are primary factors in the development of fungal infections.<sup>[16-20]</sup> In our study, the other primary factors and the usage of prophylactic antibiotics were present in all patients with fungal peritonitis. This supports the claim that these are predisposing factors in the development of fungal peritonitis.

Since our study was retrospective, our study was limited in terms of the number of patients. Nevertheless, peritonitis is an important and frequent complication observed in patients who undergo peritoneal dialysis. In cases of resistant peritonitis, fungal peritonitis as well as tuberculous peritonitis should be considered. For patients who are thought to have tuberculous peritonitis but test negative for ARB, laparoscopy should be considered if it is suitable to the patient's condition and albumin level is an important parameter for the prognosis of peritonitis patients. The course of the patient can provide information on the duration of treatment.

## Disclosures

**Ethics Committee Approval:** The study was approved by the Local Ethics Committee.

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** None declared.

**Authorship Contributions:** Concept – E.K., K.C.; Design – E.K., K.C.; Supervision – E.K.; Materials – E.K.; Data collection &/or processing – E.K.; Analysis and/or interpretation – E.K.; Literature search – E.K.; Writing – E.K.; Critical review – E.K.

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