

A Survey of Peritonitis of our Continuous Ambulatory Peritoneal Dialysis Patients

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ÖZET

Sürekli ambulatuar periton diyalizi hastalarımızda görülen peritonitlerin analizi

Amaç: Böbrek yetmezliği tedavisinde periton diyalizinin uygulanmaya başlamasıyla birlikte, teknik ile ilişkili komplikasyonlar, özellikle peritonit, periton diyalizinin sürekli ambulatuar periton diyalizi (SAPD) hastalarınca daha geniş kullanımını ve kabul görmesini kısıtlamaktadır. Bu çalışmada, SAPD hastalarımızda peritonit sıklığını, en sık etken mikroorganizmaları ve peritonit risk faktörlerini belirlemeyi amaçladık.

Gereç ve Yöntem: Çalışmaya periton diyalizi merkezimizde Ocak 1996-Aralık 2003 tarihleri arasında izlenen 132 SAPD hastası alındı (63 E, 69 K; yaş: 40.41±14.17, SAPD süresi: 38.27±18.60 ay). Peritonit şu şekilde tanımlandı: Periton diyaliz sıvısının gram boyaması veya kültüründe mikroorganizma görülmesi, beyaz küre sayısının 100 hücre/mm³'ten fazla olması, nötrofil yüzdesinin >%50'den fazla olması veya peritoneal inflamasyon semptomlarının olması. Hastalar peritonit atak sayılarına göre 3 gruba ayrıldı: Grup I= Hiç peritonit geçirmeyenler; Grup II= 1 kez peritonit geçirenler; Grup III= ≥2 kez peritonit geçirenler. Grup III'deki hastalar peritoneal enfeksiyon risk faktörleri açısından tekrar incelendi.

Bulgular: 74 hasta hiç peritonit geçirmezken, 42 hasta 1 kez, 16 hasta ≥2 kez peritonit geçirdi. Ortalama atak sayısı 2.31±0.47'di. SAPD hastalarında en sık peritonit etkeni Staphylococcus aureus ve Staphylococcus epidermidis idi. İki kez veya daha fazla peritonit geçiren hastaların ileri analizinde, bu hastalarda tekrarlayan peritonit risk faktörlerinden diyabetes mellitus, sekonder organ tüberkülozu ve amiloidoz bulunduğu belirlendi.

Sonuçlar: Eşlik eden diyabetes mellitus, sekonder organ tüberkülozu ve amiloidoz tekrarlayan peritonit geçiren SAPD hastalarında önemli risk faktörleridir. Sonuçlarımız, tekrarlayan peritonit geçiren hastalarda, risk faktörlerinin dikkatle gözden geçirilmesi, (mümkünse) ortadan kaldırılması ve uygun şekilde tedavi edilmesi gerektiğini desteklemektedir.

Anahtar kelimeler: Periton diyalizi, peritonit, risk faktörü

ABSTRACT

A survey of peritonitis of our continuous ambulatory peritoneal dialysis patients

Objective: Ever since the introduction of peritoneal dialysis in the management of renal failure, complications related to technique, particularly peritonitis, have restricted its wider use and acceptance in continuous ambulatory peritoneal dialysis (CAPD) patients. In this study, we aimed to determine the frequency, most common causative agents and risk factors for peritonitis among our CAPD patients.

Material and Methods: We included 132 CAPD patients (63 M, 69 F; age: 40.41±14.17 years, CAPD duration: 38.27±18.60 months) followed-up in our peritoneal dialysis center between January 1996-December 2003. Peritonitis was defined as the presence of organisms on gram stain or culture of peritoneal dialysis fluid, leukocytes greater than 100 cells/mm³, neutrophil count >50% of the dialysate or symptoms of peritoneal inflammation. The patients were divided into three groups according to the number of peritonitis attacks; Group I= No attacks of peritonitis; Group II= 1 attack of peritonitis; Group III= ≥2 attacks of peritonitis. The patients in Group III were further evaluated for the presence of underlying risk factors for the development of peritoneal infection.

Results: We observed no attacks in 74 patients, 1 attack in 42 patients and ≥2 attacks in 16 patients. Mean number of attacks was 2.31±0.47. The major causative microorganisms of peritonitis in our CAPD patients were Staphylococcus aureus and Staphylococcus epidermidis. The further evaluation of the patients with ≥2 attacks revealed that concomitant diabetes mellitus, secondary organ tuberculosis, and amyloidosis came forward as underlying risk factors for repeated peritonitis.

Conclusions: Concomitant diabetes mellitus, secondary organ tuberculosis, and amyloidosis were risk factors in CAPD patients with repeated episodes of peritonitis. Our results emphasize that in patients with repeated attacks; patients' risk factors must be carefully evaluated, (if possible) eliminated, and appropriately treated.

Key words: Peritoneal dialysis, peritonitis, risk factors

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INTRODUCTION

Ever since the introduction of peritoneal dialysis in the management of renal failure, complications related

to the technique have restricted its wider use and acceptance in end-stage renal disease patients. The complications of peritoneal dialysis, particularly peritonitis, account for considerable morbidity, hospitalization, and even therapy change to hemodialysis in continuous ambulatory peritoneal dialysis (CAPD) patients (1).

In this study, we aimed to determine the frequency and the most common causative agents of peritonitis, as well as to evaluate the risk factors for peritonitis in

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patients with recurrent peritonitis among our CAPD patients.

MATERIAL AND METHODS

In our study, we included 132 CAPD patients (63 M, 69 F; age: 40.41±14.17 years, CAPD duration: 38.27±18.60 months) followed-up in our peritoneal dialysis center between January 1996-December 2003. The research was conducted in accordance with the principles set forth in the Helsinki Declaration (<http://www.wma.net/e/policy/b3.htm>). In our center, the initial and follow-up protocol of CAPD therapy includes the patients' and the family members' training in the first three weeks of the therapy by our staff. The same training protocols were applied to all 132 patients and their household members. The treatment protocols of the patients were identical. All of the 132 patients were followed-up for duration of more than 12 months. In our peritoneal dialysis center, double-bag system with titanium connector (Baxter, Dianeal 137) is used.

Peritonitis was diagnosed according to the following criteria: Presence of organisms on gram stain or culture of peritoneal dialysis fluid, leukocytes greater than 100 cells/mm³, neutrophil count >50% of the dialysate or symptoms of peritoneal inflammation (1). The patients were divided into three groups according to the number of peritonitis attacks; Group I= No attacks of peritonitis; Group II= 1 attack of peritonitis; Group III= Two or more attacks of peritonitis. The patients in Group III were further evaluated for the presence underlying risk factors for the development of peritoneal infection.

Statistical Analysis

Statistical analyses were performed using SPSS software (Statistical Package for the Social Sciences, version 10.0, SSPS Inc, Chicago, Ill, USA). The results were expressed as mean±standard deviation and as a percentage.

RESULTS

We observed no peritonitis attacks in 74 patients. Forty-two patients had one peritonitis attack, whereas two or more attacks of peritonitis were observed in 16 patients. The distribution and the percentages of 132 patients according to their numbers' of peritonitis attacks are demonstrated in Figure 1.

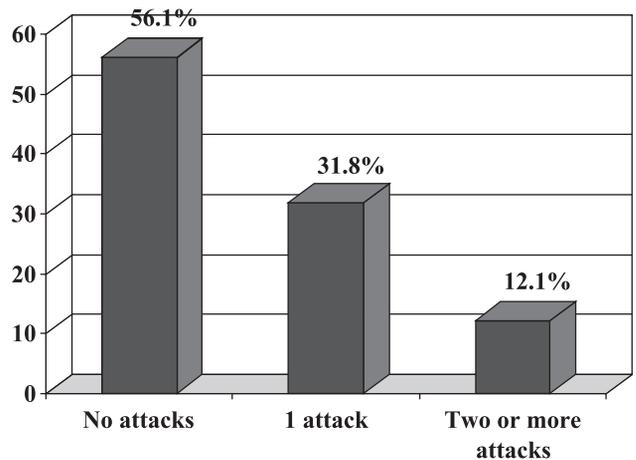


Figure 1: Distribution of 132 patients according to the number of peritonitis attacks.

The demographic characteristics and the mean duration of CAPD therapy in all three groups are shown in Table 1. After a mean follow-up duration of more than 3 years, the mean number of attacks of peritonitis was 2.31±0.47. The major causative microorganisms of peritonitis in our CAPD patients were Staphylococcus aureus and Staphylococcus epidermidis. The further evaluation of the patients who suffered more than two attacks for the risk factors of peritonitis revealed that the peritonitis was associated with catheter infection in 2 patients. Interestingly, in the patients with repeated episodes of peritonitis (Group III), concomitant diabetes mellitus, secondary organ tuberculosis and amyloidosis came forward as underlying risk factors for repeated peritonitis (Figure 2).

Table 1: Demographic characteristics and duration of continuous ambulatory peritoneal dialysis therapy in 132 patients.

	Group I (no attacks) (n=74)	Group II (1 attack) (n=42)	Group III (≥2 attacks) (n=16)
Male/Female ratio	33/41	23/19	7/9
Mean age (years) ^a	41.03±14.64	38.19±13.70	43.38 ±13.15
Mean CAPD duration (months) ^a	36.53±18.40	38.17±19.95	46.63±13.95

^aValues are expressed as mean±standard deviation.

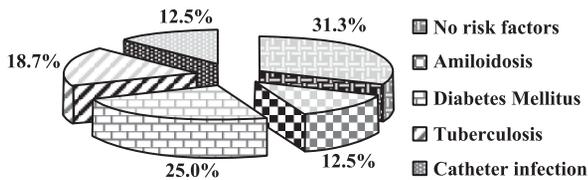


Figure 2: Demonstration of risk factors in 16 patients who suffered from ≥ 2 attacks of peritonitis.

DISCUSSION

The frequent occurrence of peritonitis remains the major complication of peritoneal dialysis and up until very recently has hindered its development and acceptance. Peritonitis readily occurs amongst peritoneal dialysis patients, following minor episodes of contamination of the peritoneum by microorganisms. Due to permanent bathing of the peritoneal dialysis fluid, infection readily diffuses to the entire peritoneal cavity. Toxic manifestations are unusual, fever is often lacking or moderate and very few blood cultures are positive in CAPD patients suffering from peritonitis. Turbidity of the drain bag is the earliest detector of a possible peritoneal infection. The influence of hyperosmolar acidic dialysis solution on the phagocytic function of intraperitoneal neutrophils and macrophages, and a deficiency of opsonins in the peritoneal fluid facilitates the occurrence of bacterial peritonitis in some CAPD patients (1). The infection typically resolves rapidly after the institution of antimicrobial therapy that is usually continued for a 2-week course. Episodes of peritonitis with the same organism and same sensitivity pattern within the 4-week period after the completion of antimicrobial therapy are defined as having a recurrent or relapsing episode of peritonitis. The development of another episode of peritonitis with the same organism and same sensitivity pattern more than 4 weeks after the completion of antimicrobial therapy is considered a repeat episode of peritonitis. Nearly 80% of patients who develop more than one episode of peritonitis develop repeat infections. *Staphylococcus epidermidis* (22.2%) and *Staphylococcus aureus* (14.6%) are the most common species of organisms isolated in peritonitis, while different gram-negative organisms account for 28% of the episodes of peritonitis. Staphylococci are the most likely bacteria to result in repeat episodes of

peritonitis (2). In our CAPD patients, gram positive microorganisms predominated as the agents of peritonitis and gram negative organisms were relatively rarely isolated, which was in accordance with the literature.

Numerous risk factors have been associated with the development of peritonitis. Identification of these risk factors has provided insight into the pathophysiology of peritonitis associated with peritoneal dialysis therapy (2). With the improvements in connection technology (introduction of Y-set and double bag systems), the peritonitis rates declined further around 0.5 episodes per patients year (3). Treatment of the exit-site infections includes early, experienced, aseptic technique with non-irritating solutions and catheter immobilization to prevent infection. The prolonged usage of antibiotic therapy is also another risk factor for the development of peritonitis, leading to the emergence of resistant microorganisms as well as fungal infections (2).

Patients' risk factors for the development of peritonitis identified higher rates for children, African Americans, native Canadians and those with a history of substance abuse and lower socioeconomic status. Recent studies disclosed that immunosuppression, HIV-positive status, intake of gastric acid inhibitors and upper respiratory tract infections are also risk factors (3). Studies reveal that 40–60% of peritoneal dialysis patients are carriers of *staphylococcus aureus*. A chronic *staphylococcus aureus* carrier state is a risk factor for the development of exit-site infection and of peritonitis (4). Eventually, the type of the connection system and nasal carriage of staphylococci still remain the strongest dialysis-related risk factors for the development of peritonitis and the elimination of staphylococci at the nares not only decreases the exit-site infection but the risk of staphylococcal peritonitis as well (3,5). In our series of CAPD patients, Y-sets and double bag systems, which have significantly lower risks of peritonitis, were used. Interestingly, apart from all known patient and technique related risk factors, concomitant diabetes mellitus, secondary organ tuberculosis and amyloidosis came forward as underlying risk factors in patients with repeated episodes of peritonitis. When these patients with risk factors were excluded, the frequency of bacterial peritonitis in our patients was extremely low. Our results also emphasize that the training and guidance of the patients and their household members

minimizes the occurrence of bacterial peritonitis attacks. Whereas, in patients with repeated attacks, patients'

risk factors must be carefully evaluated, (if possible) eliminated, and appropriately treated.

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