Intraperitoneal Amikacine Provoked Perceptive Deafness in CAPD - Continuous Ambulatory Peritoneal Dialysis Patient

Lutfi Zylbeari[1], Sihana Ahmeti Lika[2], Mirlind Behxheti[2], Zamira Bexheti[2], Jetmire Jakupi-Alimani[2], Hanife Ahmeti[2], Ferizate Dika Haxhirexha[2], Ledia Kaci[2], Kastriot Haxhirexha[1, 2], Nasir Behxheti[2]

[1] Clinician and Professor at Department of Internal Medicine, Faculty of Medical Sciences, U. of Tetova, Macedonia
[2]Clinical Hospital, Tetova, Macedonia
*Corresponding author: Prof. Dr. Lutfi Zylbeari, lutfi.zylbeari@unite.edu.mk

Abstract

Peritonitis (P) is the main complication and primary limiting factor in the extension of continuous ambulatory peritoneal dialysis(CAPD) in developing countries, because of exposure to potential external contamination, especially in people with unsatisfactory hygiene habits.We will present a case of peritonitis in 62 years old woman after the first three months of CAPD treatment. The peritoneal infection is confirmed by cloudy fluid with increased WBC in the dialysis solution (2300..1300..1100 cells/cmm; polymorphonuclears between 60% to 80%), augmented fluid protein content(cca.2.4 g/l), presence of microorganisms and symptoms of acute peritoneal infection(isolated *Enterobacteria* species, abdominal pain and diarrhoea). The peritonitis was treated following the Oreopoulos group's recommendations[1] and after a report of the sensitivity of the isolated Enterobacteria, with appropriate antibiotic (Amikacine) in recommended intraperitoneal dose. Three days after successful treatment of peritonitis, the definite deafness is developed.

Keywords: *CAPD, peritonitis, intraperitoneal amikacine*

Introduction

Peritonitis is one of the most frequent and flared complications of CAPD therapy. It provokes morbidity causing difficulties in dialysis process and by repeated attacks may lead to peritoneal membrane sclerosis, loss of ultrafiltering capacity, inability to dialyse and, finally, that is a risk of increasing mortality. Therefore, the improvement in peritonitis prevention, early detection of disease and efficacious treatment are of paramount importance.The aim of our paper is to present the possibility of toxic medicamentous effect in practical clinical work using well known antibiotics, broadly indicated in the treatment of CAPD associated peritonitis (CAPD-RP) in the precisely recommended dose regimen.

Case report

Mrs A.C., 62 years old woman, hospitalized in Nephrology Department(intensive care unit, ICU) because a worsed chronic renal failure as a consequence of insulin requiring diabetes mellitus many years ago. Several months before, she was submitted to chronic hemodialysis replacement therapy(CHD).

At the admission in ICU, she presents with hyperhydratation, congestive heart failure, atrial fibrillation and uremic fibrinous pericarditis. Because of frequent and prolonged hypotonic intrahemodialytic episodes associated with repetitive precordial pain crisis, the hemodialysis process was very often aborted and flared uremic state emerged (polyse-rositis, pericarditis). Afer 6 days intensive care unit treatment, the CAPD therapy was proposed as a better replacement dialysis procedure. The Tenckoff catheter was inserted into the Douglas space and the patient was submitted to learn the basic principles of CAPD therapy procedure. After three months successful CAPD treatment, the patient consults our department one time more, in pronounced generalized septic state accompanied by fever, elevated corporal temperature (more than 39^0C), abdominal pains, diffuse abdominal resistance and other objective parameters defining diffuse peritonitis. The characteristic signs for evolution of CAPD-RP are presented in the following table.

EVOLUTION OF CAPD-ASSOCIATED PERITONITIS

	DAYS OF TREATMENT						
	I	II	III	IV	V	VI	VII
View of effluent (+,–)	++++	++++	+++	++	+	-	-
Number of WBC (/cmm)	2300	2000	1300	1100	600	300	180
Fluid proteins (g/l)	2.4	2.0	1.2	1.1	0.5	0.2	0.15
Isolated germs (Entero-bacteria)	++	+	-	-	-	-	-
Clinical state	pain	pain	tenderness	-	-	-	-

In the sediment of peritoneal effluent, the first day of the disease, more than 80% inside

present cells were polymorphonuclears and in the following days the percentage was diminished (60%, 50%) with augmented number of peritoneal macrophags.

Immediately after detection of CAPD-RP (positive culture from peritoneal effluent) and pa-

tient admission to the hospital, the treatment was beginning following the recommendations of Oreopoulos'group (1981)[1] and guidelines proposed by Keane WF et al.(1989).[2]

The antimicrobial therapy was initiated with amikacine (aminoglikozide with minimal toxicity) in the loading dose of 500 mg per two liters dialysis solution, followed by maintenance doses of 150 mg/day in the next seven days. Simultaneously, cephalotin sodium was used in the loading dose of 1000 mg/2 l dialysis solution followed by maintenance dose of 200 mg/2 l dialysis solution (four times daily, with each exchange). Routinely heparinization was practiced (1000 U per dialyzate bag) to prevent intraperitoneal and pericatheteral fibrin deposition. Following the Keane's prescription, cephalosporin and aminozide were separately introduced in the peritoneal cavity (in different bags).

In the beginning of the treatment,the changement of the dialyzate solution was realized every three hours (in all three changes following the type "in and out"), and thereafter as usuale every 5-6 hours. Imediatelly before the intraperitoneal medicaments application, the patiente was loaded with amikacine 7.5 mg/kg/bw (500 mg,i.v.).

After differentiation of microorganisme (*Enterobacteria species)* and approved sensitivity to amikacine, the therapy was continued until the end of the week. Because the number of BWC in the effluent was bigger than 100 cells/cmm (N^{o} = 180 cells/cmm), the catheter was extracted, and the treatment was continued in the next 7 days orally with tetracicllines. In the mean time the diabetes mellitus was regulated with s.c. insulin application. At the end of the treatment period (7 days), the clinical and laboratory findings of the CAPD-RP were completely retired. The subclavian catheter was placed and the chronic hemodialysis restarted once more. Three days after successful therapy of CAPD-RP, the symptoms of bilateral total cochleo-vestibular organ lesions were detected (vertigo, walking instability and definitive perceptive deafness). The special audio-vestibular testing before therapy was not accomplished, because clinically the patient have not demonstered earlier any above mentioned symptoms orienting cochleo-vestibular lesions (hypacusia, dizziness). The treatment recommended by otologist (mainly B group vitamins like B6 and B_1) was resultless.

The dose regimen concerning amikacine was conducted following the pharmaceutical recommendations for dialytic patients (T/2=D/2) every 42 hours (or 3.5 mg/kg bw; 3.5x70= 225 mg). Taking into consideration the 7 days drug's administration (168 hours namely), the total permitted dose was: 168:42 = 4 x 225 mg amikacine (900 mg) not including the initial peritoneal and intramuscular loading doses (500+500 mg).

Cephalotin was applied strictly following the recommendation of Keane et al (1989). In this manner, the total dose of applied antibiotics in the treatment period of CAPD-RP was 1900 mg for amikacine and 7000 mg fo cephalotin (2.2 gr in the first 24 hours, and the rest of 4.8 gr- in the next 6 days).

Discussion

The CAPD-RP is the most frequent complication of peritoneal dialysis in all possible variants (acute, intermittent peritoneal dialysis and CAPD/CCPD itself). The crucial raison for this infection is dialysate contamination following the process of fluid installation or progression of microbial agent along the peritoneal Tenchoff catheter from insertion site to the peritoneal cavity. Rarely, the hematogenic dissemination is possible (about 10% of cases, mainly provoked by *Streptoccocus viridans*) or perforate bowel lesion with fecal contamination. The most frequent microbial agent involved in the genesis of CAPD-RP is *Staphyloccocus epydermidis* (cca 40% from all investigated cases) in the gram positive bacterial group. The gram-negative microbs are present in only 30%.

In the preclinical phase of the CAPD-RP the diagnosis is made with s.c. "leukocyte esterase sensitive test strip", increased number of dialysate polymorphonuclear leukocytes with parallel diarrheal episodes in CAPD patients, without abdominal sensitivity at the time of profound palpation.

Prevention of CAPD-RP is conducted with rigor-

ous aseptic manipulation including the dialyzate instillation, better dialyzate bags connection with Tenckoff catheter and use of adequate desinfection agents. After each episode of CAPD-RP, the patient must be submitted once more to reeducational procedure. Some authors propose intraperitoneal application of gamma-interferon in attempt to augmente the bactericidal capacity of peritoneal macrophages (Lamperi et al.1989)[4].

Antibiotic prophylaxis is discrepant and doubtful. Probably, there is no correlation betwen the humoral/cellular immunity state and CAPD-RP. The IgG intraperitoneal secretion more than 14% of total blood proteins, almost every time suggests CAPD-RP occurrence. The intraperitoneal application of polyclonal IgG every three weeks, may significantly improve the bacterial oppsonization (Lamperi et al.1986)[3]. The developed vaccines against the most frequent encountered bacteria (coagulasa negative *staphyloccocus,f.i.*) have not proved completely his efficacy.

Conclusion

The treatment of CAPD-RP is successful in the largest number of cases, but the special attention must be devoted to the following two questions:

Justifiableness for combination of two potentially ototoxic drugs (in the our case: amikacine and cephalotin). Justifiableness for adjuncted loading dose (i.m;i.p.) of aminozides, which can overpass the maximal proposed dose for dialysis dependent ESKD patients.

References

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