



Outcomes of Continuous Ambulatory Peritoneal Dialysis (CAPD) in Amyloidosis Induced End Stage Renal Failure Cat: Case Report*

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Summary: A 10 year old, 4.4 kg bodyweight, mixed breed castrated male cat was brought to our clinics with a history of halitosis, weakness, anorexia and polyuria. According to clinical and laboratory examination results, amyloidosis induced end-stage renal failure was diagnosed. Since the patient did not respond the medical therapy, we decided to perform peritoneal dialysis. The serum urea and creatinine levels were gradually decreased. Urea reduction rate was 59.9%. Serum potassium, bicarbonate and chlor levels reached the reference interval. However, phosphor level was still high. Application process and clinical results of the 20 day continuous ambulatory peritoneal dialysis process was aimed to share in an amyloidosis induced end stage renal failure cat with this case report.

Key words: Cat, end stage renal failure, peritoneal dialysis

Amiloidozis Kaynaklı Son Dönem Böbrek Yetmezliği Hastası Bir Kedide Sürekli Ayakta Periton Diyaliz Uygulamasının Sonuçları: Olgu Sunumu

Özet: Olgumuzu, kliniğimize ağız kokusu, iştahsızlık, güçsüzlük ve poliüri şikayetleriyle getirilen 10 yaşında 4.4 kg ağırlığında kastre edilmiş erkek, melez ırk bir kedi oluşturdu. Hastaya klinik, laboratuvar ve histopatoloji bulguları ışığında amiloidozis kaynaklı son dönem böbrek yetmezliği tanısı kondu. Medikal tedaviye cevap vermeyen hastaya periton diyaliz uygulaması yapılmasına karar verildi. Serum üre ve kreatinin değerleri zaman içerisinde geriledi. Üre azalma oranı %59.9 olarak hesaplandı. Serum potasyum, bikarbonat ve klor değerleri referans aralığa getirildi ancak fosfor seviyesi düşürülemedi. Bu olgu sunumuyla, amiloidozis kaynaklı son dönem böbrek yetmezliği hastası bir kedide, 20 günlük periton diyaliz uygulamasının aşamalarını, ve klinik sonuçlarını paylaşmak amaçlanmıştır.

Anahtar kelimeler: Kedi, periton diyaliz, son dönem böbrek yetmezliği

Introduction

Chronic renal failure is a very common cause of illness and death in cats (8). There are many renal replacement therapies used in veterinary medicine for use in case of this situation. These are hemodialysis, peritoneal dialysis, continuous renal replacement therapy and renal transplantation (7). Peritoneal dialysis has some advantageous aspects for animals compared to other replacement therapies, because it is

cheap, does not require specific or complex equipment and it is easy to use especially in patients with low body weight (1). Also it is known that, it has some advantages like longer survival times and improved animal welfare when compared to symptomatic medical therapies which we routinely use in our clinics.

Case

A 10 year old, 4.4 kg bodyweight, mixed breed castrated male cat was presented to the our clinics with a history of halitosis, weakness, anorexia and polyuria. According to clinical and laboratory examination results, end-stage chronic renal failure was diagnosed. Toxoplasma IgG and IgM were found to be positive. Am-

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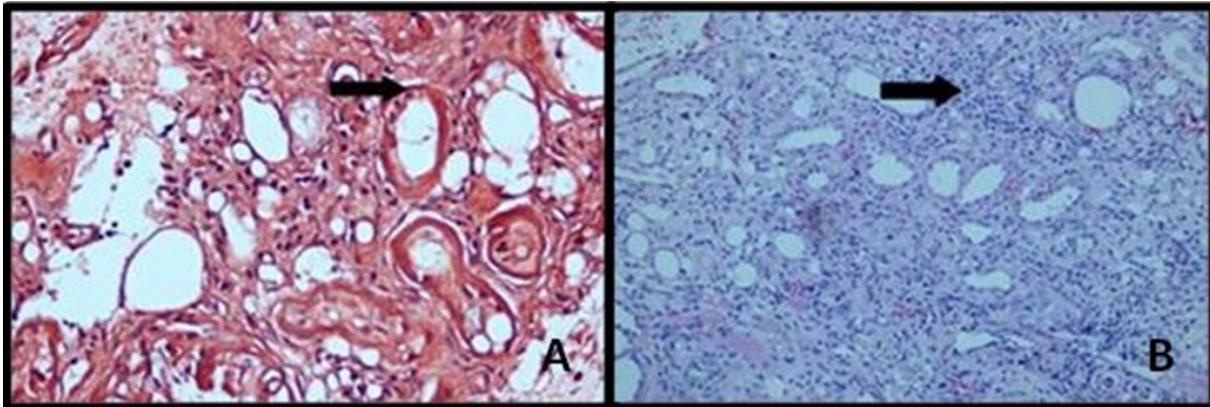


Figure 1. A: Amyloid accumulation in glomerulus (black arrow) (Congo-Red); **B:** Diffuse inflammatory cell infiltration (black arrow) and tubulointerstitial nephritis (H.E.)

lyoidosis was diagnosed according to the histopathological evaluation of tru-cut biopsy samples taking from both kidneys (Figure 1A). Tubulointerstitial nephritis was also determined in the sections (Figure 1B).

After the end-stage renal failure was diagnosed, medical therapy (fluid therapy, vitamins, antiacids, kidney diet...) was started. Since the patient did not respond the medical therapy, we decided to perform peritoneal dialysis as a renal replacement therapy. A written consent was taken from the owner of the cat.

Catheter placement was performed under general anesthesia. Patient positioned in dorsal recumbency, dorsal and left lateral abdomen was clipped between the xiphoid to the pubis and aseptically prepared. Animal was draped and aseptic technique maintained to avoid catheter contamination and peritonitis.

Mini-surgical approach was chosen for the placement of the peritoneal dialysis catheter. Two centimeters long, paramedian skin and subcutaneous tissue incision was made three cm lateral to umbilicus. Rectus abdominis muscle was incised and the partial omentectomy was performed. A pediatric bent neck coiled tenckhoff peritoneal dialysis catheter with two cuffs (KIMAL, Arundel Road, Uxbridge, Middlesex, England) was inserted in the abdominal cavity through the pelvis. In order to prevent the catheter from the omental entrapment, the intra-abdominal part of the catheter was placed between colon descendens and urinary bladder. The inner cuff was attached to rectus abdominis muscle with purse-string suture. Distal tip of the catheter was tunneled through the subcutaneous tissues to exit the skin five cm away from

the abdominal incision. In order to prevent the surrounding tissues from tunnel infection, no suture attachment was performed to outer cuff. Catheter placement was verified by infusing and retrieving 20 ml dialysis solution (dialysate) into abdominal cavity. Catheter Adaptor Luer-Lock with closure Cap (Fresenius Medical Care) and stay safe Catheter Extension Luer-Lock 32 cm (stay safe®, Fresenius Medical Care) were attached to the peritoneal dialysis catheter and the extra-abdominal part of the catheter was bandaged to the abdominal wall.

CAPD was performed ninety five times in 20 days period. Body temperature, systolic blood pressure and body weight measurements of the patients were recorded before every session. Pediatric pd-paed (Fresenius Medical Care) system was used for the filling and draining of dialysate. The application was started by draining of the dialysate (effluent) within the abdomen. In order to prevent peritonitis, 125mg/L cephazoline sodium (Cefamezin®, Eczacibasi, Turkey) was added into the dialysate inside the pd-paed's inflow burette, for each session. Also, 500 U/L heparine sodium (Nevparin®, Mustafa Nevzat, Turkey) was added into dialysate bag in order to prevent the catheter flow problems. Serum potassium level was measured by certain intervals and 4.5 mEq/L KCL (Potassium Chloride®, Biofarma, Turkey) was added into the dialysate bag when necessary. Catheter exit side leakage and any urination and defecation between sessions were recorded. The suture area and catheter exit side were disinfected by using 10% povidone iodine (Betakon®, Aroma, Turkey). The catheter exit side was closed by sterile gauze, and the catheter was bandaged to

the abdominal wall. Hands were cleaned by aseptic technique for three minutes and used mask before all applications.

Peritoneal dialysis was started using a dialysate containing 1.5% glucose (Fresenius CAPD 2 Stay Safe Peritoneal Dialysis Solution 1.5% glucose, 1.75 Ca, 2000 ml). Initial exchange volume was started at 10 mL/kg. This amount gradually increased to 30 mL/kg in time. The volume and composition of the dialysate was decided according to several factors including the patient's body weight, effluent volume, hydration status estimated by skin turgor, reduction rate of serum urea and creatinine levels, blood pressure and dwell time (waiting time of dialysate into abdominal cavity). Dialysates including 1.5% and 2.3% glucose (Fresenius CAPD 4 Stay Safe Peritoneum Dialysis Solution 2.30% glucose, 1.75 Ca, 2000 mL) were used through 20 day period.

Peritoneal dialysis solution which contains 1.5% glucose was used (10mL/kg) once every two hours for the first three days in order to prevent

any catheter exit side leakage and to provide sufficient dialysis. The chosen treatment model for first three days was, six hour dwell at night, followed by frequent exchange during day time. Then the treatment model was changed to classical CAPD (four times in a day). Dialysis solution which contains 2.3% glucose was used generally in night exchanges and rarely in day time to ultrafiltration of free water and increase the effectiveness of the dialysis.

No parenteral drug administration was performed other than 12.5 mg/kg IM clindamycin phosphate (Klindan[®], Bilim, Turkey) during the 20 days period. On the third, sixth and 11th days of peritoneal dialysis, whole blood which were taken from major and minor cross-matches compatible donors were administered. In order to prevent the catabolism and to provide sufficient calories, half of a dietary canned food (Hill's feline k/d) was homogenized in 25 ml water and then one dosing spoon enteric phosphate binder (Ipakitine[®], Vetoquinol, France) were added into the mixture, and the patient

Table 1. Change in hemogram and serum biochemistry parameters in 20 days peritoneal dialysis period.

Parameters	1th day	3th day	7th day	15th day	20th day
pH (7.24-7.4)	7.24	7.31	7.4	7.4	7.4
Na (151-161mmol/L)	157	158	143	150	150
Cl (117-129 mmol/L)	112	111	98	123	123
Ca (9.3-11 mg/dl)	9.7	9.5	8.7	9.8	10.0
Mg (1.5-2.7 mg/dl)	2.1	2.0	2.65	2.3	2.5
P (2.9-7.7 mg/dl)	9.0	12.7	11.6	13.1	9.7
HCO ₃ (24-34 mEq/L)	12.9	18.3	29.1	24.0	27.0
K (3.5-5.1 mmol/L)	3.0	2.3	5.1	4.6	4.5
TP (6.1-8.8 g/dl)	6.5	6.4	10.5	6.9	6.8
Alb (2.6-4.3 g/dl)	2.2	2.4	2.5	2.6	2.2
RBC (4.95-10.5*10 ⁶ µl)	3.17	3.40	3.88	5.7	4.2
HCT (25.8-41.8 %)	14	18	18.5	27.0	13.2
HGB (8.5-14.4 g/dl)	4.2	5.3	5.8	9.0	4.2
WBC (3.8-19 *10 ³ µl)	35.9	42.0	24.1	21	21.4
PLT (160-600 *10 ³ µl)	186	210	143	312	358
Urea (13.4-32.5) mg/dl)	295	254	246.8	171.7	118.1
Creatinine (0.6-2.4) mg/dl)	13.5	12.2	9.8	11.2	6.8

was tried to be fed by feeding force.

Urea and creatinine levels of the serum and the effluent were measured and recorded following each peritoneal dialysis session, within the first seven days. This procedure was repeated once a day during the next 13 days. Blood pH, serum Na, Cl, Ca, Mg, P, bicarbonate, K, total protein and albumin levels and complete blood counts result were recorded on the first, third, seventh, 15th and 20th days (Table 1).

Serum K, bicarbonate and Cl levels reached the reference interval at the end of the 20th day. However, P level was still high. Serum albumin level was low as like as the pre-dialytic period. Total protein, Mg and Ca levels were normal both before and after the dialysis. Erythrocyte, hematocrit and hemoglobin levels followed a fluctuating course throughout the treatment and the leukocyte levels gradually decreased but never turned in reference interval. The venous pH was in the reference interval both pre-dialytic period and at the end of the dialysis. Serum urea level decreased from 285 mg/dL to 118.1 mg/dL and serum creatinine level decreased from 13.5 to 6.8mg/dL at the end of the peritoneal dialysis.

Catheter plugging, bleeding, catheter exit side or tunnel infection, dialysate leakage, acute pleural effusion or peritonitis like complications were not observed. Urea reduction rate (URR) was measured as 59.9% according to the following formula: $URR = \frac{[(Pre\ BUN - Post\ BUN)]}{(Pre\ BUN)} \times 100$

The owner of the patient desired to continue peritoneal dialysis at home. The owner was properly educated and the cat was discharged. However, the owner could not be able to apply peritoneal dialysis at home. The cat lost his life after the ninth day of discharge.

Discussion

Peritoneal dialysis is a technique used to remove toxins or excess solutes from the body by using the peritoneal membrane's semipermeable character (3-6). It has been used since 1920s in human medicine (3,9) and commonly use for treatment of chronic kidney disease and end stage renal failure both humans (2) and animals (3).

The clinical improvement provided by CAPD in end-stage renal failure patient cat which could not be able to respond to the environmental stimuli, was satisfactory. When it is considered

that hemodialysis can not be performed in animals as a renal replacement therapy in our country, this first clinical trial clearly demonstrated that, peritoneal dialysis can be used in order to regulate the electrolyte and acid-base balance, improve the clinical status, and to decrease the mortality of patients.

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