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**TREATMENT OF A PATIENT WITH CHRONIC
RENAL FAILURE DIALYZED WITH CAPD METHOD
HOSPITALIZED DUE TO PERITONEAL INFECTION**

**Postępowanie z pacjentem z przewlekłą niewydolnością nerek, dializowanym
metodą CADO hospitalizowanym z powodu zakażenia otrzewnej**

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A - Koncepcja i projekt badania, B - Gromadzenie i/lub zestawianie danych, C - Analiza i interpretacja danych, D - Napisanie artykułu, E - Krytyczne zrecenzowanie artykułu, F - Zatwierdzenie ostatecznej wersji artykułu

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Abstract (in Polish):

Jedną z chorób cywilizacyjnych XXI wieku jest przewlekła niewydolność nerek. Obejmuje wiele schorzeń, które dzielą się na pierwotne - dotyczą tylko nerek oraz wtórne, gdy uszkodzenie nerek to skutek toczącego się procesu ogólnoustrojowego. Składa się ona z 5 stadiów, w zależności od stopnia wydolności nerek mierzonego za pomocą stopnia przesączania kłębuszkowego. Objawy są zróżnicowane i zależą od przyczyny, która doprowadziła do ich uszkodzenia. Wyróżnia się trzy metody leczenia przewlekłej niewydolności nerek: hemodializa, dializa otrzewnowa oraz przeszczep nerki. Dializa otrzewnowa powinna być pierwszą metodą dializoterapii proponowaną chorym ze schyłkową niewydolnością nerek, ponieważ pozwala na dłuższe zachowanie diurezy resztkowej niż hemodializa, co wiąże się z mniejszym ograniczeniem płynowym i dietetycznym. Pomimo licznych zalet dializy otrzewnowej, jak każda procedura medyczna, jest obciążona ryzykiem powikłań. Najczęściej występującym powikłaniem

jest dializacyjne zapalenie otrzewnej. Objawia się ono głównie bólem brzucha i zmętnieniem płynu dializacyjnego. Zalecaną metodą leczenia jest włączenie antybiotykoterapii dożylniej i dootrzewnowej, co wiąże się z hospitalizacją chorego. Powikłania infekcyjne w dializie otrzewnowej mają znaczący wpływ na jakość życia pacjentów, dlatego od pielęgniarki sprawującej opiekę nad pacjentem zakwalifikowanym do programu dializ otrzewnowych wymaga się szerokiej, aktualnej wiedzy zawodowej oraz zaangażowania w proces edukacji chorych na każdym etapie leczenia.

Abstract (in English):

One of the 21st century diseases is chronic renal failure. It includes many diseases which can be divided into primary like affecting only the kidneys and secondary, when kidney damage is the result of an ongoing systematic process. It consist of 5 stages that depends on degree of renal disfunction which is measured by the degree of glomerular filtration. Symptoms are different and depends on cause, which led to their damage. There are three treatments for chronic renal disease: hemodialysis, peritoneal dialysis, and kidney transplantation. Peritoneal dialysis should be the first method of dialysis therapy offered to patients with end-stage of renal disease because it allows residual diuresis to be maintained longer than hemodialysis, which is associated with less fluid and dietary restriction. The most common complication is dialysis peritonitis. Main symptoms are abdominal pain and clouding of the dialysis fluid. Recommended method of treatment is the introduction of intravenous and intraperitoneal antibiotics, which is associated with the hospitalization of the patient. Infectious complications in peritoneal dialysis have a significant impact on the quality of patients life, therefore nurses that caring on patients needs high professional knowledge and involvement in the patient education process on each of treatment stage.

Keywords (in Polish): dializa otrzewnowa, przewlekła niewydolność nerek, zakażenie otrzewnej.

Keywords (in English): chronic renal failure, peritoneal dialysis, peritoneal infection.

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Short title

Zakażenie otrzewnej u pacjenta dializowanego metodą CADO.

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Introduction

One of the civilization diseases of the 21st century is chronic renal failure. It is estimated that more than 4 million people in Poland may suffer from various stages of this disease [1].

PChN (chronic kidney disease) is defined as a multisymptomatic syndrome resulting from permanent damage or reduction in the number of active nephrons. It encompasses many conditions, which are divided into primary - affecting only the kidneys, and secondary, when kidney damage is the result of an ongoing systemic process [1,2]. Diabetic nephropathy, glomerulonephritis or kidney damage due to hypertension are examples of the most common causes of the disease. In addition, among genetic conditions, polycystic kidney disease is the most common cause of PChN[2].

The symptoms of PChN will depend on the cause that led to their damage. Primary kidney disease will be manifested by the presence of proteinuria, hematuria and sometimes edema and high blood pressure, and if the cause is diabetes or hypertension, the first symptom is the appearance of a small amount of albumin in the urine. Other general symptoms include weakness, fatigue, polyuria, nycturia, polydipsia. In developed PChN (chronic renal failure), uremic toxins begin to damage other organs and systems. Thus, skin pruritus, nausea, vomiting, taste disorders, abdominal pain and headaches, sleep disturbances, muscle tremors, etc. may occur [2].

In the United States, a working group of the American Nephrology Foundation (National Kidney Foundation/ Kidney Diseases Outcome Quality Initiative - NKF/ KDOQI) has introduced a new classification of PChN. It consists of 5 stages, depending on the degree of renal function as measured by glomerular filtration rate. Stage 5 is called end-stage renal failure and otherwise known as uremia. In this case, renal replacement therapy is required [3].

Therapy for chronic kidney disease consists primarily of treating the cause that led to the kidney damage and measures to inhibit further aggravation of this damage. Three basic types of treatment are available: hemodialysis, peritoneal dialysis, and kidney transplantation [4,5].

Kidney transplantation involves the implantation of a healthy kidney from a single donor, living or deceased, into a person with chronic kidney disease. The patient undergoes a nephrology consultation, and a series of examinations and tests are performed. The doctor may then place the patient on a national transplant waiting list. Receiving a new kidney is a treatment, but not a cure for disease [5].

Hemodialysis is a procedure in which blood is drawn from a blood vessel and passed through a dialyzer, where it is purified before being returned to the body. This dialyzer is thus referred to as an artificial kidney. Hemodialysis is usually performed for at least four hours three times a week, generally at a dialysis center [5].

The third type of treatment is peritoneal dialysis, which should be the first method of dialysis offered to patients with end-stage renal failure, as it allows residual diuresis to be maintained for longer than hemodialysis, allowing less fluid and dietary restrictions to be used. During peritoneal dialysis, blood is filtered in the peritoneum, the membrane that lines the peritoneal cavity. To perform peritoneal dialysis, it is necessary to implant a catheter into the peritoneal cavity. Through the drain, dialysis fluid is introduced into the peritoneal cavity, allowing filtration and absorption of impurities from the blood. The fluid is then drained into a bag and replaced with new dialysis fluid. This filling and draining process can be done manually during the day- CADO (Continuous Ambulatory Peritoneal Dialysis) or automatically at night- ADO (Automated Peritoneal Dialysis) using a cycler[5].

Peritoneal dialysis treatment is preceded by a holistic assessment of the patient's clinical situation in terms of motivation and possible contraindications to this type of therapy and then taking steps to insert a catheter into the peritoneal cavity. These catheters are differentiated by the length of the internal

and intraluminal segments. Since 1968, the most commonly used catheter has been the simple Tenckhoff catheter with two muffs. The catheter is inserted by an experienced team, in the operating room with full aseptics, usually under local anesthesia. Proper placement of the catheter allows it to work properly for a long time.[6] Contraindications to chronic peritoneal dialysis treatment can be divided into absolute and relative. Absolute contraindications include lack of cooperation and ability to conduct DO (peritoneal dialysis) by the patient and caregiver, loss of peritoneal membrane function (in patients on peritoneal dialysis in the past), extensive abdominal procedures with peritoneal damage. Relative contraindications include obesity, polycystic kidney and liver disease, colonic diverticulosis, presence of colostomy and/or nephrostomy, inflammatory lesions on the abdominal skin, prolapse of the reproductive organs in women or inguinal and abdominal hernias [7]. Peritoneal catheter placement is usually done 2-3 weeks before dialysis begins. This is the time to educate the patient and his caregiver in maintaining optimal fluid balance and diet, controlling blood pressure, taking prescribed medications, leading a rational lifestyle and optimal physical activity, as well as to learn in detail about the treatment method, possible complications and the principles of preventing these complications. Practical issues carried out during the training also include: the technique of washing hands, the procedure for performing dialysis fluid changes, the procedure for performing dressing changes at the outlet of the Tenckhoff catheter, the principles of keeping a dialysis chart. Theoretical training includes, among other things, basic knowledge of peritoneal dialysis, discussion of how to prepare a place to perform dialysis procedures at home, storage, storage, heating of dialysis fluids and equipment, or management of emergency, unforeseen situations. Patient education will lead to positive treatment outcomes and improve patient comfort [8].

Despite the numerous advantages of peritoneal dialysis, such as the ability to perform dialysis at home which affects comfort and quality of life, reduced visits to the hospital or dialysis center, lower risk of hepatitis C, lower risk of renal anemia or improved cardiovascular stability, it, like any medical procedure, is fraught with the risk of complications [9]. These can be divided into infectious and non-infectious. Non-infectious complications include: abdominal hernias (umbilical and inguinal) associated with increased intra-abdominal pressure, dialysate streaking occurring as a result of dialysis fluid entering the peritoneal cavity via a route other than through the peritoneal catheter, gastrointestinal functional disorders, and decreased peritoneal ultrafiltration. Infectious complications, on the other hand, include both inflammation of the external orifice and tunnel of the peritoneal catheter and dialysis peritonitis, which is the most common complication [9,10]. Symptoms of DZO (dialysis peritonitis) include clouding of the draining dialysate, abdominal pain, fever, nausea and diarrhea. The etiological agents most often include Gram (+) bacteria: cutaneous staphylococcus, staphylococcus aureus, streptococci, enterococci, less frequently Gram (-) bacteria, including difficult-to-treat blue pus bacilli, even less frequently fungi and mycobacteria. The development of DZO can occur via the transcatheter route - with bacteria from the skin, by touch - during system connection, or infection along the subcutaneous tunnel as a consequence of percutaneous infection [11]. Treatment of dialysis peritonitis involves the administration of analgesics, heparin for dialysate, and antibiotics by intravenous and intraperitoneal routes. When the patient's condition and test results do not improve within 5 days, removal of the dialysis catheter should be considered [11].

Purpose

The purpose of the following paper was to present a management plan for a patient with chronic renal failure, on CADO dialysis, hospitalized for peritoneal infection and his main nursing problems using the International Classification for Nursing Practice (ICNP®).

Case presentation

A patient referred by the dialysis station to the department of internal medicine and nephrology for abdominal pain. The patient was on the thirteenth day after insertion of a Tenckhoff catheter. On the day of admission to the ward, the dialysis station performed a catheter flush- cloudy fluid. The woman suffers from chronic renal failure and type 2 diabetes mellitus. The rationale for admission to the ward was the treatment of dialysis peritonitis.

The patient's general condition was stable. Patient conscious logical verbal contact preserved. Excessive nutrition. Vital parameters during hospitalization remained within normal limits: 110/60-130/80 mmHg, heart rate steady: 60-75 u/min, glycemic level 130- 190 mg%. During the hospitalization, the patient did not have a fever.

The patient was put on management according to her individual medical order sheet. The woman followed a diabetic diet, a glycemic profile and insulin therapy were administered-Liprolog 14 units in the morning, 18 units at noon, 14 units in the evening, and Humulin N insulin from 10 to 14 units at 9 pm, depending on the glycemic level. The recommended fluid intake was to be up to 1.5 liters/day.

Table 1. Nursing process of the patient - selected issues

Nursing diagnosis	Goals of nursing	Nursing interventions	Results
Discomfort caused by abdominal pain	Relief of pain and physical discomfort	-assessment of pain severity on the VAS scale, -relief of pain, -delivery of medicines by intravenous route as ordered by the doctor, -evaluation and documentation of nursing activities	Patient's self-perception improved, abdominal pain reduced
Development risk infections	-reducing the risk of developing infections, -prophylaxis of complications	-collection of blood and dialysate for diagnostic tests, -administration of medicines by intraperitoneal and intravenous routes as ordered by the doctor, -individual management of peritoneal dialysis treatments, -adherence to a protein-rich diet, -conducting re-education including adherence to the principles of hygiene and aseptics to prevent reoccurrence of DZO, techniques for carrying out exchanges, -monitoring of general condition, vital signs, complaints reported by the patient, -observance of aseptic and antiseptic principles when performing medical procedures	No infection has developed
Risk of conductivity patient caused insufficient ultrafiltration peritoneal	Prevention of conductivity and complications	-restriction of fluid intake, -keeping a strict fluid balance with careful analysis of the diary in terms of the concentration of dialysis fluids used and the dehydration of individual exchanges, urine output and fluid supply, -Daily monitoring of body weight and blood pressure, -education of the patient on the importance of a sensible diet (reduction in salt intake and fluid intake	Conduction and complications did not occur. Hydration status within normal limits

Table 2. The patient's nursing process based on ICNP®

Negative diagnosis	Interventions	Positive diagnosis
Discomfort [10023066] abdominal pain [10043953]	-assessment of pain [10026119]. -pain monitoring [10038929]. -administration of an analgesic drug [10023084]. -administration of intravenous drug [10045836]. -pain management [10011660]. -monitoring response to treatment [10032109] -consultation of pain management [10024331]. -assessment of discomfort [10050089]	reduced pain [10027917]
risk of infection [10015133]	-Vital blood sampling [10044633]. -sampling [10004588] -teaching about health-seeking behaviour [10032956]. -promoting health-seeking behaviour [10032465]. -monitoring of physical signs and symptoms of infection [10012203]. -assessing signs and symptoms of infection [10044182]. -assessing signs and symptoms of infection [10044182]. -use of aseptic technique [10041784] -diet regime management [10023861] -administration of antibiotic [10030383]. -monitoring response to treatment [10032109] -body temperature monitoring [10012165] -learning about skin self-care [10033029]. -management of peritoneal dialysis [10031920]. -learning about peritoneal dialysis [10045242].	without infection [10028945].
Imbalance fluids [10042335]	-hydration management [10046317] -monitoring of fluid intake [10035303]. -monitoring of fluid excretion [10035319]. -teaching about fluid intake [10032939]. -measuring fluid excretion [10039250]. -management of fluid therapy [10042096] -assessment of fluid intake [10044176]. -weighing the patient [10033323] -weight monitoring [10032121] -measuring blood pressure [10031996]. -blood pressure monitoring [10032052]. -assessing adherence to recommendations [10024185] -reinforcing adherence to recommendations [10024562] -patient advice [10031062]. -interaction with fluid therapy [10030948]. -management of peritoneal dialysis [10031920].	adequate hydration [10042065]

Intravenous and intraperitoneal antibiotic therapy was also administered with the drugs: Ceftazidime and Cefazolin. Oral medications taken included: Calperos at a dose of 1,000 mg twice a day and Alfadiol once a day 0.25 mg. Re-education on peritoneal dialysis was also among the doctor's recommendations.

Table 1 and 2 below show the proposed plan of care, highlighting the three main nursing problems, for a patient with chronic renal failure treated with CADO, hospitalized for dialysis peritonitis according to the ICNP® classification, 2019 version [12,13].

The patient was mainly monitored during her stay for three parameters from blood serum and dialysis fluid: CRP (C Reactive Protein), creatinine and pleocytosis. Table 3 below presents how their values changed after the included antibiotic therapy.

Table 3. CRP, creatinine and pleocytosis values during antibiotic therapy on consecutive days of hospitalisation

Hospitalisation day	CRP	Creatinine	Pleocytosis
0	52.3 mg/l	CREA 4.3 mg/dl GFR 11.8 ml/min	1.01 ng/ml
I	134.5 mg/l	-	9375 in ul
IV	58 mg/l	CREA 3.7mg/dl GFR 14.1ml/min	430 in ul
VII	46.2 mg/l	CREA 3.7 mg/dl GFR 13.7ml/min	178 in ul
X	47.9 mg/l	CREA 3.9mg/dl GFR 13.2 ml/min	94 in ul

The patient was discharged from the hospital in good general condition after treatment and re-education.

Discussion

The patient, despite chronic diseases and the occurrence of a CADO-related complication in the form of peritoneal infection, is able to partially function independently despite weakness. She requires re-education, increased knowledge of how to prevent complications of peritoneal dialysis and possible worrisome symptoms, and support. Taking into account the patient's current condition and the patient's problems, the following care models were implemented.

The model of care according to Dorothea Orem, which is based on the theory of self-care deficit, distinguishing three systems of nursing: fully compensatory, partially compensatory, supportive-teaching [14].

Two of these were used in the patient's care: the supportive-teaching model and the partially-compensatory model. The nurse assists the patient with activities she is not fully capable of performing. She also acts as an educator. She supports in terms of knowledge and motivates the woman.

Another model applied to the patient's care is the Callista Roy model. It assumes helping the patient adjust to a new situation in her life. The nurse is supposed to shape positive attitudes toward life, health and oneself, and develop the patient's ability to cope with difficult situations. It is also important to support development by getting the patient to try to solve problems independently [14].

The last model implemented in patient care is the nursing model according to Virginia Henderson, based on the theory of human needs. It is crucial to meet the basic needs of life when the patient was debilitated and it was difficult for her to meet them herself. Thus, it is necessary to apply nursing assistance in order for the patient to achieve independence as soon as possible [14].

Several cases of dialysis peritoneal infection have been described in the available literature. Treatment consisted of antibiotic therapy, with positive results.

Examples include the patients described by Carlini et al. and the second case described by Cheung et al. These were men aged 78 and 69 years suffering from chronic renal failure and treated with CADO. The patients developed dialysis peritonitis. In the first man, treatment was started with cefotaxime and tobramycin and then, after an antibiogram was obtained, ciprofloxacin with teicoplanine and intravenous amoxicillin with clavulonic acid were administered [15].

In the second case, cefotaxime and intravenous tobramycin were used, followed by intraperitoneal administration of cefazolin with cefepime after obtaining the results of the abdominal culture [15].

Conclusions

1. There are three options for renal replacement therapy: peritoneal dialysis, hemodialysis, and kidney transplantation. Peritoneal dialysis can be performed at home, which is more comfortable for the patient than hemodialysis performed at a dialysis station.
2. There are dangers inherent in DO treatment of chronic renal failure, including dialysis peritonitis.
3. treatment of DO consists of appropriate antibiotic therapy, administered by intravenous and/or intraperitoneal route.
4. patient education, about the danger of infection and methods of prevention, has a significant impact on the quality of the patient's health. Patient health-promoting behaviors can significantly reduce the risk of emergence or recurrence of the disease.

References

1. Rutkowski B., Przewlekła choroba nerek – klasyfikacja, epidemiologia i diagnostyka, Forum Nefrologiczne, 2008, 1, 1, 1-6.
2. Białobrzaska B., Dębska-Ślizień A., Pielęgniarstwo nefrologiczne, PZWL Wydawnictwo Lekarskie, 2013.
3. Daugirdas J. T., Blake P.G., Ing T.S., Podręcznik dializoterapii, 2008, Wydawnictwo Czelej, Lublin.
4. Wańkiewicz Z., Dializa otrzewnowa - metoda leczenia chorych w podeszłym wieku, Medycyna Wiek Podeszłego, 2011, 1, 1, 42-47.
5. Lange J., Matuszkiewicz-Rowińska J., Dializa otrzewnowa w ostrej niewydolności nerek, Wydawnictwo Lekarskie PZWL, 2006.
6. Pączek L., Mucha K., Foroniewicz B., Choroby wewnętrzne. Podręcznik dla studentów pielęgniarstwa i położnictwa, Wydawnictwo Lekarskie PZWL, 2009.
7. Renke M., et al. Przewlekła choroba nerek – istotne informacje dla lekarza medycyny pracy, Medycyna Pracy, 2018, 69, 1, 67-75.
8. Jaroszyński A., Przewlekła choroba nerek, [w:] Medycyna rodzinna: podręcznik dla lekarzy i studentów, Wydawnictwo Termedia, Poznań, 2015, 413-414.
9. Gajewski P., Interna Szczeklika, Medycyna Praktyczna, 2020, Kraków.
10. Wieczorek M., Żółtańska J., Lesińska-Sawicka M., Rola i zadania pielęgniarki sprawującej opiekę nad pacjentem podczas zabiegu hemodializy, Zeszyty Naukowe Państwowej Wyższej Szkoły Zawodowej im. Witelona w Legnicy, 2018, 26, 1, 55-71.

11. Kózka M., Płaszewska – Żywko L., *Diagnozy i interwencje pielęgniarskie*, Wydawnictwo Lekarskie PZWL, Warszawa, 2008, 121-126, 192-197, 214-219.
12. Źródło internetowe: <https://www.icn.ch/what-we-do/projects/ehealth/icnp-browser> (06.12.2021r.)
13. Kilańska D., *Międzynarodowa klasyfikacja praktyki pielęgniarskiej – ICNP® w praktyce pielęgniarskiej*, Wydawnictwo Lekarskie PZWL, 2014, Warszawa .
14. Płaszewska-Żywko L., Kózka M., *Modele opieki pielęgniarskiej nad chorym dorosłym*, Wydawnictwo Lekarskie PZWL, 2010, Warszawa.
15. Szczyra D., Grzeszczak W., *Forum Nefrologiczne*, 2019, 12, 3, 182-186.