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Kidney replacement therapy in elderly population. What kind of barriers do we have to defeat?

Leczenie nerkozastępcze u pacjentów w wieku podeszłym. Jakie ograniczenia musimy pokonać?

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Abstract

Chronic kidney disease (CKD) is a global worldwide medical and social problem affecting patients of all ages, but elderly patients on dialysis face unique challenges. This article reviews some problems of elderly CKD population on haemodialysis (HD) and peritoneal dialysis (PD). We are focused on vascular access in haemodialysis patients, idea of home therapy, assisted PD and other problems of elderly dialysis patients: frailty, mental disorders, malnutrition, palliative care, withdrawal from dialysis. We also discuss kidney transplantation (KT) and the problem of kidney replacement therapy (KRT) versus conservative approach in elderly patients CKD patients. (Gerontol Pol 2025; 33; 143-150) doi: 10.53139/GP.20253317

Keywords: *chronic kidney disease, elderly population, haemodialysis, peritoneal dialysis, kidney transplantation*

Streszczenie

Przewlekła choroba nerek (PChN) jest globalnym problemem medycznym i społecznym dotykającym pacjentów w każdym wieku, ale pacjenci w podeszłym wieku zwłaszcza leczeni nerkozastępczo, z uwagi na liczne problemy są swoistym wyzwaniem. W artykule omówiono niektóre problemy populacji chorych w podeszłym wieku z PChN leczonych metodą hemodializy (HD) i dializy otrzewnowej (DO). Skoncentrowano się na dostępie naczyniowym u pacjentów hemodializowanych, idei terapii domowej, asystowanej dializie otrzewnowej, niektórych problemach starszych pacjentów dializowanych: zespole kruchości, zaburzeniach psychicznych, niedożywieniu a także opiece paliatywnej, problemie zaprzestania dializoterapii. Omówiono również zagadnienie przeszczepienia nerki oraz porównano korzyści z leczenia nerkozastępczego versus leczenia zachowawczego u osób w wieku podeszłym z PChN. (Gerontol Pol 2025; 33; 143-150) doi: 10.53139/GP.20253317

Słowa kluczowe*: przewlekła choroba nerek, osoby w wieku podeszłym, hemodializoterapia, dializa otrzewnowa, przeszczepienie nerki*

Background

Chronic kidney disease (CKD) is a progressive condition that affects approximately 11%-13% of the general population worldwide, amounting to more than 850 million individuals. CKD is more prevalent in older individuals experiencing diabetes mellitus type 2 (T2D) hypertension, cardiovascular diseases. It is more common in women or racial minorities [1,2]**.** CKD is strongly related with increased risk of cardiovascular deaths, all-cause mortality, risk of hospitalizations, decreased quality of life and progression to end-stage kidney disease (ESKD) with needs for kidney replacement therapy (KRT). Presumably, CKD will become the fifth global cause of death by 2040 and diabetic kidney disease in elderly population will remain the crucial medical problem [3]. "Elderly" has been defined as a chronological age of 65 years old or older, while those from 65 through 74 years old are referred to as "early elderly". People over 75 years old are considered as "late elderly."

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[4]. There are big differences between elderly people. Some 80-year-olds have physical and mental capacities similar to many 30-year-olds (elderly fit). Other elderly experience significant declines in capacities at much younger ages. Besides many medical problems in this population such as hearing loss, cataracts and refractive errors, osteoarthritis, chronic obstructive pulmonary disease, T2D, hypertension, coronary artery disease, congestive heart failure (CHF), depression and dementia, falls and fractures another important problem is CKD. The impact of age on CKD prevalence and reported a linearly higher prevalence for CKD stages 1–5 associated with advancing age, ranging from 13.7% in the 30- to 40-year-old group to 27.9% in patients aged >70 to 80 years [5]. Some at advanced stages of ESKD will enter chronic KRT programmes such as haemodialysis (HD), peritoneal dialysis (PD) or kidney transplantation (KT).

Geriatric syndromes in elderly CKD population

The frailty syndrome is often found in CKD population. As it was shown by Rocco more than 2 decades ago, patients with moderate to advanced CKD have reduced quality of life and increased frequency of "poor symptoms" such as weakness, lack of energy, muscle cramps and psychologic distress. [6].

The first and most widely used diagnostic criteria for frailty syndrome were proposed by Fried et al. in 2001. According to them, a diagnosis of frailty can be made if at least 3 out of the following 5 conditions are met: unintentional weight loss (more than 5 kg/year), self-reported exhaustion, muscular weakness, slow walking speed, and low physical activity [7,8]. Still, since those early propositions, a number of other methods (clinical tests, questionnaires) have been developed to evaluate frailty in patients. They examine the various constituent elements of the frailty syndrome: physical (physical activity, nutritional status, grip force), mental (cognitive function, mood), and social (social support vs. isolation). The best known instruments include the Cardiovascular Health Study Scale (CHS), the Edmonton Frail Scale (EFS), and the Tilburg Frailty Indicator (TFI) [9].

Many components of frailty syndrome can be found in CKD population. It is important to mention that frailty is not synonymous of aging. The prevalence of frailty is approximately 14% in CKD stage 1-4 and 47% in dialysis patients <65years and 71% of dialysis patients >65years. The mechanisms of frailty in CKD population is complex and comprise of increased inflammation, renal anaemia, anorexia and weight loss, hormonal changes, decrease muscle strength, depression, fluid overload [10]. The mechanisms of frailty and possible treatment approach are presented in table I.

Table I. Mechanisms and management of frailty

Mechanisms of frailty	Management of frailty
1. Chronic inflammation	Pharmacological agents, optimization of dialysis
2. Anaemia	Erythropoiesis stimulating agents
3. Poor nutrition, weight loss, sarcopenia	Nutritional support, physical activity
4. Hormonal changes	Hormonal replacement
5. Decrease muscle strength	Intradialytic exercise programme
6. Depression	Psychotherapy/antidepressants
7. Fluid overload	Dietary intervention, adequate dialysis

Kuczborska et al. found that frailty syndrome is very common in haemodialyzed patients (the prevalence of frailty in older haemodialysis patients vary from 60-70%). Moreover, the authors of this study identified the most significant parameters for diagnosis of frailty: low concentrations of albumin and total protein, low potassium concentration before HD, and elevated levels of CRP. They recommended these parameters as screening test for frailty [11].

CKD population may also suffer from other geriatric syndromes (closely related with frailty) including gait impairment, falls, chronic fatigue, cognitive impairment, chronic pain and malnutrition. Frailty in elderly dialysis patients is associated with cognitive impairment and increased rates of hospitalisations and mortality [8]. In the absence of home support, the majority of elderly patients are placed on in-center haemodialysis primarily for safety concerns.

Haemodialysis in elderly population

Management of elderly patients on haemodialysis (HD) has received increasing attention in recent years – not only because of the burgeoning numbers of these patients but also due to the growing understanding that this population has a unique profile of medical and social needs. In developed countries, more than half of the incident dialysis population is over 65 years of age, and those over 75-year-old are the fastest growing group initiating dialysis [1]. The same tendency is observed in polish CKD population. In the absence of home support, the majority of elderly patients are placed on in-center haemodialysis. The haemodialysis frequency and standard of thrice weekly four-hours haemodialysis session should be revised in elderly patients. An individual ha-

emodialysis schedule and incremental haemodialysis should be applied in these patients. Less frequent HD sessions (twice a week) should be a practical option. Moreover, the standard Kt/V urea clarence target may not be applicable to elderly on haemodialysis [12].

One of the important problem in elderly HD population is vascular access (VA). The golden standard in younger population i.e. arteriovenous fistula form native vessels does not refer to elderly population. High prevalence of comorbidities, particularly diabetes mellitus, general atherosclerosis, peripheral vascular disease make creation of arteriovenous fistula extremely difficult. Moreover, many elderly patients may have insufficient vasculature for fistula maturation. The strategy "fistula first" in elderly population should be revised [13]. The elderly patients can be considered as a candidate for arteriovenous fistula creation and age should not be a limiting factor for such decision. However, in many situation creation of arteriovenous fistula can not be possible and therefore alternative VA such as central venous catheter (CVC) (tunnelled catheter) or arteriovenous graft should be taken into account. Besides many comorbidities, relatively shorter life expectancy makes catheter very common option for haemodialysis treatment [13,14]. On the other hand, vascular access–related infections are more prevalent in patients with CVCs than those with arteriovenous fistulas (AVFs) or arteriovenous grafts (AVGs) [15]. A fourfold increase in risk of infectious complications in patients initiating dialysis with a CVC compared to either a fistula or graft. The risk is further increased to about sevenfold when a CVC is used as the prevalent access [16].

Elderly patients on haemodialysis are at highest risk of cardiovascular events and cardiac deaths. Hypertension is highly prevalent and up to 75-90% of HD patients are noted to be hypertensive. This implicate sometimes complicated antihypertensive medication regimen. Another medical problem in this population, is high prevalence of congestive heart failure, coronary artery disease, cerebrovascular disease, thoraco-abdominal aneurysms. Moreover, higher prevalence of myocardial stunning, intradialytic hypotension, cardiac arrhythmias, and transient cerebral hypoperfusion were reported in HD patients than in PD patients [17,18]. The intradialytic hypotension is frequent and serious complication of HD may lead to falls and bones fractures. In addition, myocardial stunning, cerebral hypoperfusion, and prolonged post-dialysis recovery time potentiate the risk of falls. The post-dialysis recovery time is shorter with more frequent HD but this can be difficult to achieve in elderly patients [18].

Depression, sleep disturbances and cognitive impairment are highly prevalent in HD population. Depressed patients presented poor quality of life. This problem is ranging from 23% to up 39% according to tools were used in depression assessment. Teams dealing with older haemodialysis patients should include depression and quality of life assessments in routine care protocols. In Brazilian study, HD patients with depression presented lower serum albumin and higher parathormone levels. Depression is also related with increased risk of usage of emergency services, hospitalisations, greater medical costs and risk of death [19]. Besides depression, the prevalence of cognitive disorders is increasing in elderly dialysis patients. The origin of these derangements is multifactorial. Accumulation of uremic toxins which are capable to enter central nervous system to brain-blood barrier play a major role. Yiannopouloua K et al. described 5 cases of patients on regular HD with moderate Alzheimer disease (AD) and cognitive impairment successfully treated with donepezil at the dose of 5mg daily. Because of renal excretion acetylocholinesterase inhibitors (such as donepezil) are rather avoided in HD patients. The authors of this paper pointed out improvement in cognitive and executive function in treated patients without any episodes of drug toxicity [20]. Hyung Woo Kim et al. investigated the association between dialysis adequacy and the risk of cognitive impairment. They revealed increased dialysis clearance and higher kt/V index were associated with a lower risk of developing dementia in elderly haemodialysis patients [21].

Another important problem of KRT patients is malnutrition. The origin of malnutrition is multifactorial. The most common causes of malnutrition in dialysis elderly patients include: insufficient nutrient intake, gastrointestinal disorders (inflammation of the gastrointestinal tract and associated malabsorption of nutrients), increased caloric requirements, loss of nutrients during dialysis, disturbances in the senses of smell and taste, generalized inflammation, low dialysis dose, drug interactions with food ingredients. Malnutrition often coexists with chronic inflammatory disease that promotes the development of atherosclerosis, which in turn leads to increased cardiovascular mortality. Malnutrition is common in haemodialysis and peritoneal dialysis patients, and adversely affects the patients' quality of life [22]. It is important to prevent malnutrition and to increase patients' quality of life with early diagnosis and treatment of patients who are at risk of malnutrition. It would be useful to routinely use nutrition and quality of life scores in dialysis monthly evaluations. Moreover, the valuable option of treatment of HD malnourished patients which

allow for evident improvement is intradialytic parenteral nutrition (IDPN).

Pain and discomfort during haemodialysis treatment is sometimes underappreciated in the elderly. Prolonged stationary positioning in a chair or bed may be challenging for patients with arthritis and other musculoskeletal pain syndromes. Functional limitations in frail and elderly populations along with a lack of home support create a significant barrier for the implementation of home haemodialysis. The concept of dialysis at home environment may result in improved patient survival and a reduction in cardiovascular risk profile is worth attention. This form of therapy realized as supported home haemodialysis can facilitate treatment of elderly patients [23]. So far home haemodialysis is inaccessible for ESKD patients in Poland. In addition to the concept of home haemodialysis, there is much concern about extended hours home haemodialysis but this form may be difficult to accept in this population. Disadvantages of this modality of KRT can be social isolation, poor quality of life and burnout syndrome [24,25]. Less frequent HD is more required in elderly patients.

Peritoneal dialysis in elderly population

Peritoneal dialysis is one of the current KRT modality. Worldwide, peritoneal dialysis (PD) accounts for 9% of all KRT and 11% of all dialysis patients. [26,27]. In most countries, elderly patients who initiate KRT are much more likely to be commenced on HD than PD [28]. This is despite PD offering comparable medical outcomes and potentially a better quality of life than haemodialysis, as will be discussed. In the United States, the prevalence of PD use is relatively low in the general dialysis population. However, this situation is further exacerbated in the elderly. United States Renal Data System (USRDS) data reveals that only 6,3% of the 65–74 age group and 5.6% of the over 75 age group are on PD as their mode of KRT [28]. In Poland and other European countries PD seems to be underutilized. In Poland according to National Nephrological Registry at the end of 2023y, PD patients accounts only 4% of all KRT patients [30].

The reasons for the wide variation in use of PD in elderly patients are multifactorial, including financial, resource availability, and cultural issues. However, a particular concern is that unfamiliarity of providers with the use of PD in elderly patients leads to a self-perpetuating cycle of underuse. This is especially of note because, given the opportunity, many elderly would elect PD. It is not always an option; in one study, it was considered contraindicated for medical or social reasons in about one half of patients older than 65 yr. However, if there was not a contraindication, one third of elderly patients elected to start PD rather than HD [31]. Elderly patients on PD can do quite well: the 2- and 5-yr survival of patients over 65yr of age in Hong Kong was reported to be 88 and 56%, respectively [32].

Residual kidney function (RKF) has been associated with better survival, less morbidity, and improved quality of life in peritoneal dialysis (PD) patients. Since higher peritoneal clearance does not lead to better outcomes, more emphasis should be put on preserving kidney function. Many other benefits have been reported, including better volume and blood pressure control, better nutritional status, lower rates of PD peritonitis, preserved erythropoietin and vitamin D production, middle molecule clearance, lower left ventricular hypertrophy, and better serum phosphate level [33].

The good option of treatment in elderly population is assisted (supported) PD. It can be done by a member family or in institutionalized care by medical professional [34]. Another valuable option of treatment is incremental PD prescription is an ideal option to supplement RKF in PD patients, which also offers more flexibility to the patient and possibly, improved adherence.

Both PD and HD pose challenges for elderly patients. PD requires an appropriate living situation, some degree of mobility and vision, a peritoneum not disrupted by prior surgeries, and the ability to learn and independently perform a daily medical technique. Although many elderly can accomplish this, for very elderly patients (80 yr old), 60% may require assistance. [23]. Brown E et al. pointed out that some obstacles in long term PD treatment can be successfully overcome. Some obstacles in PD treatment in elderly patients and how to encourage them are presented in table II.

Table II. Obstacles in PD treatment and how to overcome them (own modification)

Obstacles in PD treatment in elderly	Solution
1. Prior surgery	Consider surgical placed catheter
2. Obesity	Consider surgical placed catheter and appropriate placement of exit site.
3. Malnutrition	Dietary counselling, consider Nutrineal for 1 daily exchange.
4. Impaired physical activity/falls	Assisted PD
5. General frailty	Assisted PD
6. Anxiety/depression/ cognitive dysfunction	Psychological assessment, appropriate pharmacological treatment.
7. Social isolation	Family support, assisted PD

Abbreviations: PD – peritoneal dialysis.

Sakai et al. in his study indicated that elderly patients on PD treatment did not show inferior technical survival, but patient survival was shorter than in the younger elderly patients. Elderly patients can be treated using assistant (supported PD) but some of them are able to exchange PD dialysate by themselves. Although patient survival might be shorter in the elderly patients, choosing to initiate PD seems to be a good option when considering the better quality of life afforded by home care [35]. It is worth noting that the risk of peritonitis is also significantly increased in older adults but the increased age has no impact on technique survival [36].

PD seems to be flexible form of treatment. It can be implemented as incremental PD (2-3 daily fluid exchanges in CAPD, concept of day-off in continuous ambulatory peritoneal dialysis (CAPD) or automated peritoneal dialysis (APD), assisted CAPD/APD. Moreover, detrimental PD (palliative PD) with decreasing the dose of dialysis maybe performed in some clinical situation (the end stage phase of heart failure or cancer). This form of treatment is focused on relief some symptoms (dyspnoea). On the other hand HD requires less technical participation, but there can be a substantial cost in time spent in the procedure and traveling to dialysis units, especially if transportation assistance is needed. The dialysis procedure can also be particularly exhausting for elderly patients. Furthermore, vascular access can be difficult in this population [37].

Since the onset of the COVID-19 pandemic, efforts to encourage homebased dialysis options have increased due to risks of infective transmission for patients receiving haemodialysis in hospital center-based units. In such special situation there are various practical and clinical advantages for patients receiving PD at home [38]. The main advantage of patients being on PD is that they can carry out the dialysis treatment in their own homes. Performing home dialysis treatment, a PD patient can minimize interpersonal contact by avoiding the need to reach the haemodialysis facility three times a week. In addition, the patient nullifies exposure to the virus while travelling from home to the centre on public transport services and waiting for the start of the dialysis treatment. In addition, PD patients have the advantage of reducing close contact with health-care workers, who can be potentially affected by SARS-CoV-2 infection [39]. Therefore, PD appears the best KRT for patients with end-stage kidney disease during the COVID-19 outbreak, (and any infectious diseases outbreaks), as contact plays a crucial role in the spread of this infectious disease.

Kidney transplantation in elderly population

In compare to younger patients, elderly CKD patients are less likely to undergo kidney transplantation. Elderly patients may also be a candidate for kidney transplant (KT) and this option of treatment may be also suitable for them. Chronological age is not a barrier to KT and there is no age limitation. However, in older patients, the decision between long-term dialysis and KT can be difficult due to potential obstacles especially many co-morbidities. As it was mentioned before, elderly patients have many problems such as frailty, cognitive impairment, and multiple comorbidities. All of them threaten patient and allograft survival after transplant. Aging cause changes in the immune system and affects the pharmacokinetics of drugs, which may increase the risk of complications such as infections and malignancies after transplantation. Adani et al. pointed out that KT in patients older than 65 years old may be safe, feasible and there is a good graft survival. In their study mortality was statistically significant in patients older than 71 years despite of persistent low graft loss [40]. KT in elderly is now a clinical reality but it is worth to remember that strategies to modify recipient co-morbidities and personalized approaches to organ allocation and immunosuppression are required [41]. Recent meta-analysis which enrolled 293 501 KT recipients was designed to assess outcomes in patents aged > 70 compared to < 70 years old. In the study group 8,1% of KT recipients were older than 70. The study shoved worse 5-year patient survival and 5-year graft survival among patient aged > 70 years compared with younger KT recipients. However, 1-year and 3-year graft survival, delayed graft function and acute rejection rates were similar in both groups. Among KT recipients frail patients and those with cognitive impairment are at higher risk of mortality. Comprehensive geriatric assessment seems to be valuable for selecting elderly ESKD patients who will benefit from kidney transplantation [42]. In summary elderly ESKD patients should also be taken into account as a candidate for KT but individual approach seems to be mandatory in each patient.

Kidney replacement therapy versus conservative management of advanced ESKD in elderly patients

Conservative care (CC) is also a treatment option in elderly people with ESKD, particularly in patients with multiple comorbidities and frailty syndrome. CC aims to provide comfort and maintain independence. Verbene et al. revealed that in patients aged ≥80 years or with se-

vere comorbidities there were no significant differences in the overall survival of patients on CC compared with patients on dialysis. There were no differences between CC patients and dialysis patients with regard to physical and mental health summary scores. What is more, the number of hospital free days was significantly higher in CC patients. Annual costs of treatment were also lower in patients on conservative care compared with patients on dialysis. Based on these results conservative care seems to be a viable treatment option in older patients with advanced CKD, and those with severe comorbidities. The decision on CC should be made collaboratively with participation of the patient, their family and health care provider as shared decision. It should consider overall health, personal preferences, life expectancy and quality of life goals [43].

Conclusions

CKD is a worldwide health problem of high prevalence. Aging societies with high prevalence of hypertension, diabetes and cardiovascular diseases cause increased number of ESKD cases with the need for KRT. All geriatric syndromes are present in elderly KRT population and faced a special challenge. Goal-oriented dialysis and patient-centred approach with share decision making may facilitate comprehensive medical care in elderly dialysis population. Chronological age is not a limitation to KT and elderly patients may also benefit from such treatment.

Conflict of interest
None

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