

Bulletin de la Dialyse à Domicile

Peritoneal dialysis in polycystic kidney disease patients Moroccan experience at the UCH Ibn Sina

(La dialyse péritonéale chez les malades atteints de polykystose rénale : expérience marocaine au CHU Ibn Sina)

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Résumé

Introduction : Ces dernières années plusieurs travaux ont montré que la dialyse péritonéale peut être utilisée en première intention chez les patients atteints de polykystose (PKR). Il est possible cependant que les résultats varient d'un pays à l'autre en fonction de son organisation ou expérience ou du profil de la population concernée. Ainsi les patients pris en DP au Maroc sont plus jeunes que ceux des pays européens, la France en particulier. Le but de notre travail était d'analyser et comparer les paramètres clinico-biologiques, l'évolution de la fonction rénale résiduelle et les complications spécifiques de la DP chez les sujets PKR traité par DP par rapport à ceux n'ayant pas de PKR et traité par la même technique de suppléance, dans notre centre.

Patients et méthodes : étude rétrospective, observationnelle entre juillet 2006 et octobre 2019 incluant 191 patients en DP dont 15 ayant une PKR au Centre Hospitalier Universitaire d'Ibn Sina de Rabat-Maroc.

Résultats : la prévalence de la PKR en DP était de 8.9%. La PKR était associée à une meilleure qualité de dialyse par rapport au groupe non PKR grâce à la persistance de la fonction rénale résiduelle. Les facteurs prédictifs d'une dialyse adéquate dans le groupe PKR sont l'IMC <22 kg/m² et la persistance de la fonction rénale résiduelle au bout de 3 ans de DP. Les hernies sont plus fréquentes chez les PKR (20%) mais aucun facteur prédictif n'a été identifié. La survie patient est similaire dans les deux groupes alors que la survie technique est significativement meilleure dans le groupe PKR

Conclusion : Les résultats de notre centre dans une population plus jeune que d'autres pays confirment l'intérêt d'utiliser la dialyse péritonéale chez les patients atteints de polykystose ; la bonne préservation de la diurèse résiduelle et une survie au minimum identique aux autres patients justifie cette attitude.

Mots clés : diurèse résiduelle, hernie, polykystose rénale, survie, dialyse péritonéale

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Summary

Introduction:

In recent years, several studies have shown that peritoneal dialysis can be used as a first-line treatment for patients with polycystic kidney disease (PKR). However, the results may vary from one country to another, depending on its organization or experience or the profile of the population concerned. For example, PD patients in Morocco are younger than those in European countries, particularly France.

The aim of our work was to analyze and compare the clinical-biological parameters, the evolution of residual renal function and the specific complications of PD in PKR subjects treated with PD compared to those without PKR and treated by the same technique of substitution in our center.

Patients and methods: Retrospective, observational study conducted between July 2006 and October 2019 at the Ibn Sina University Hospital Center in Rabat, Morocco, which involved 191 PD patients, including 15 with PKR.

Results: The prevalence of PKR in PD was 8.9%. PKR was associated with better dialysis quality than in the non-PKR group due to the persistence of RRF. Predictors of adequate dialysis in the PKR group were BMI <22 kg/m² and persistence of residual renal function (RRF) after 3 years of PD. Hernias were more frequent in PKR (20%), but no predictive factors were identified. Patient survival was similar in both groups, while technical survival was significantly better in the PKR group.

Conclusion: The results of our study in a younger population than in other countries confirm the effectiveness of using peritoneal dialysis in patients with polycystic kidney disease; the good preservation of residual diuresis and a survival rate at least identical to that of other patients justify this approach.

Key words : hernia, polycystic kidney disease, residual renal function, survival, peritoneal dialysis

INTRODUCTION

Autosomal dominant polycystic kidney disease is the most common inherited kidney disease, affecting more than 12.5 million people worldwide [1]. It progresses to end-stage chronic renal disease (ESRD) in 3 to 10% of cases [2,3].

Peritoneal dialysis (PD) in this population has sometimes been underused due to the progressive development of renal cysts, which can reduce the intraperitoneal space and increase intra-peritoneal pressure. This can lead to mechanical complication and technical problems (pleuropulmonary leaks, hernias, loss of ultrafiltration) [4]. In France, the Haute Autorité de Santé (HAS) stresses that polycystosis is not a contraindication to PD [5]. The use of PD in Morocco is more recent, and the first patients in Rabat, at the Ibn Sina University Hospital, began the treatment in 2006. The average age of our patients is lower than that observed in Europe [6]. We wanted to evaluate whether our results, obtained in a different climatic and organizational context, as well as in a population of younger dialysis patients, confirmed the utility of PD as a first-line treatment in PKR patients, and to evaluate the results compared to those of non-PKR patients dialyzed with the same technique.

The aim of our work was to analyze and compare the clinical and biological parameters, the evolution of residual renal function, the technical survival and the specific complications of PD in PKR subjects treated with PD compared to those without PKR and treated by the same technique of renal replacement therapy.

PATIENTS AND METHODS

This was a mono-centric, retrospective, observational study carried out in the Nephrology-Dialysis-Renal Transplantation service of the Ibn Sina University Hospital Center in Rabat (Morocco). It spanned a period of 13 years, from July 2006 to October 2019. This study included all end-stage renal failure patients treated by PD, whether by personal choice, through a therapeutic education program, or following a medical indication. We thus determined two groups: a group of PKR patients treated with PD (N = 15), and a group of patients without PKR and treated with the same replacement technique (N = 176).

The data were collected from the patients' medical records.

Demographic and clinical data, including gender, age, body surface area (m²), body mass index BMI (kg / m²), Charlson index, blood pressure, creatinine clearance according to the MDRD method at the start of dialysis, diuresis and residual renal function (RRF), were collected at the onset of PD.

Biochemical data were collected at 1 year, 3 years, and 5 years of PD. They were the average of the nutritional and inflammatory markers (albuminemia, serum CRP and hemoglobin level) and the RRF, as calculated by the formula: $RRF \text{ (ml / min)} = [\text{Urea clearance} + \text{Creatinine clearance}] / 2$. Hypoalbuminemia was defined as a serum level <35mg / l (a high CRP level is considered to be greater than 5 mg / l), and anemia was defined as a hemoglobin level <11 g / dl, taking into account the use or not of erythropoietin-stimulating agents.

The exchange procedures (automated PD or continuous ambulatory PD), as well as the number of exchanges per day, were specified. Dialysis dose (Kt / V) and weekly creatinine clearance (CHC) were calculated from 24 hours dialysate collection.

The specific complications of PD in PKR patients were collected (pleuroperitoneal leaks, hernias and peritonitis).

An assessment of the RRF was performed in all patients with residual diuresis on admission, and then monthly for 5 years. The decline in RRF was defined by an RRF <2ml / min after 12 months of follow-up on PD.

The causes of PD cessation were renal function recovery, kidney transplant, transfer to hemodialysis, loss of follow-up, or death. Failure of the technique was defined as death or transfer to hemodialysis following a complication of PD (peritonitis, ultrafiltration failure or malnutrition).

Comparison of patient survival curves was performed using the Logrank test.

To evaluate technical survival, we chose the composite criterion as defined by ANZDATA [7]: Technical survival is considered from initiation of PD treatment until cessation for death or transfer to hemodialysis. The rest of the patients were censored at either the end of the study or the date of the kidney transplant.

For patient survival, only deaths were considered. We censored patients at the date of transplantation, transfer to hemodialysis, or the end of the study period.

Statistical analysis was performed using SPSS software. Quantitative variables were expressed as mean or median. We compared the clinical biological data of the PKR and non-PKR group using the chi-square test for the qualitative variables and the logistic regression for the quantitative variables. A p-value less than 0.05 was considered statistically significant.

RESULTS

Of the 191 PD patients, 15 patients had a PKR, resulting in a prevalence of 8.9%. In the PKR group, the median age at the start of dialysis was 56 years, +/- 13.6, with age extremes ranging from 20 to 77 years and a clear predominance of men (sex ratio: 6.5). The mean body surface area in polycystic patients was 1.75m² ± 0.3, and the mean BMI was 22.92kg / m² ± 4.98. The creatinine clearance at the start of dialysis was 7.09 ml / min ± 3.64, with a mean diuresis of 1560 ml / 24h ± 573 and an average RRF of 8.25 ml / min ± 3.

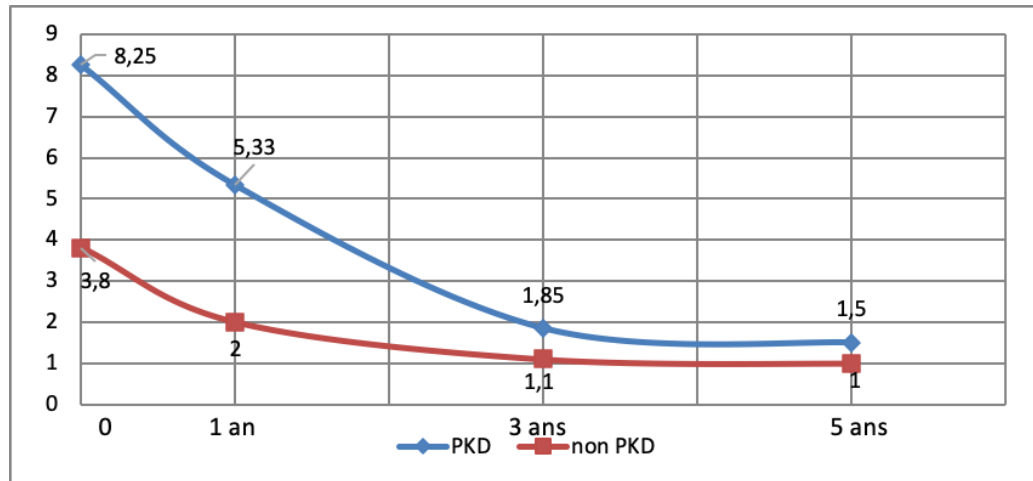
When the clinico-biological parameters of the PKR and non-PKR groups on admission were compared, PKR was associated with a higher RRF than that of non-PKR patients (p= 0.005) (Table I)

↓ *Table I. Comparison of clinical and biological parameters between the 2 groups on admission*

	PKR	Non-PKR	P
Number of dialyzed patients	15	176	-
Median age at dialysis onset (years)	56	46	-
Sex ratio (M/F)	6.5	1.09	-
Charlson index	2.60	2.68	
Body surface area (m ²)	1.75	1.64	0.93
BMI (kg/m ²)	22.92	24.22	0.67
Systolic pressure (mmHg)	133.5	135	0.87
Diastolic pressure (mmHg)	78.5	77.5	0.76
LDiuresi (ml/24h)	1560	1262	0.06
RRF (ml/min)	8.25	5.23	0.005
Creatinine clearance (ml/min)	7.09	5.82	0.94

The comparison of clinical and biological parameters between the two groups was carried out using logistic regression. The RRF was preserved in the two groups (> 2 ml / min), but was significantly higher in the PKR group (p: 0.005).

The decline of the RRF, defined by an RRF <2 ml / min, was more marked in the non-PKR group compared to the PKR group. This difference was significant after one year of PD (Figure 1).



↑ Figure 1. The decline of RRF in both PKR and non-PKR groups

The hemoglobin level was similar in the two groups (11 g / dl), but erythropoietin-stimulating agents were not used in the PKR group. Hypoalbuminemia was noted in PKR patients compared to non-PKR patients (32.5 versus 35 mg / l); CRP was negative in the PKR group and around 8 mg / l in the non-PKR group, but this difference was not statistically significant.

DPCA was used in 13 PKR patients (87%) versus 141 (80%) in the non-PKR group. 60% of the PKR patients were under 2 exchanges, versus 33.5% in the non-PKR group thanks to the persistence of the RRF.

Polycystic kidney disease was associated with an adequate dialysis dose for 3 years of PD (Table II). In multivariate analysis, a $KT / V \geq 1.7$ was correlated with a BMI <22 kg / m² and with the persistence of the RRF after 3 years of PD.

↓ Table II. Comparison of the average dialysis dose between the 2 groups at 1 month and at 1, 3 and 5 years of PD, using logistic regression

	KT/V (PKR)	KT/V (non-PKR)	p
1 month	1,72	1,71	0.98
1 year	2,07	1,56	0.05
3 years	1,92	1,41	0.04
5 years	1,9	1,3	0.08

There was no significant difference in weekly creatinine clearance between the 2 groups (Table III).

↓ Table III. Comparison of weekly creatinine clearance WCC between the 2 groups

	WCC (PKR)	WCC (non-PKR)	p
1 month	101	80	0.12
1 year	84	66	0.23
3 years	80	62	0.33
5 years	71	62	0.54

During the study period, three PKR patients presented with a hernia (20%) versus two non-PKR patients (1.13%). This difference was significant (p: 0.001). The second mechanical complication was the pleuro-pulmonary leak diagnosed in two PKR patients (13.33%), versus eight (4.54%) in the non-PKR group. All the hernias were treated by mesh with subsequent PD revision, and no nephrectomy was performed in the PKR group. In univariate analysis, no factors, including body surface area <1.5m², BMI <22 kg / m² and DPCA technique, were correlated with the occurrence of mechanical complications in the PKR group.

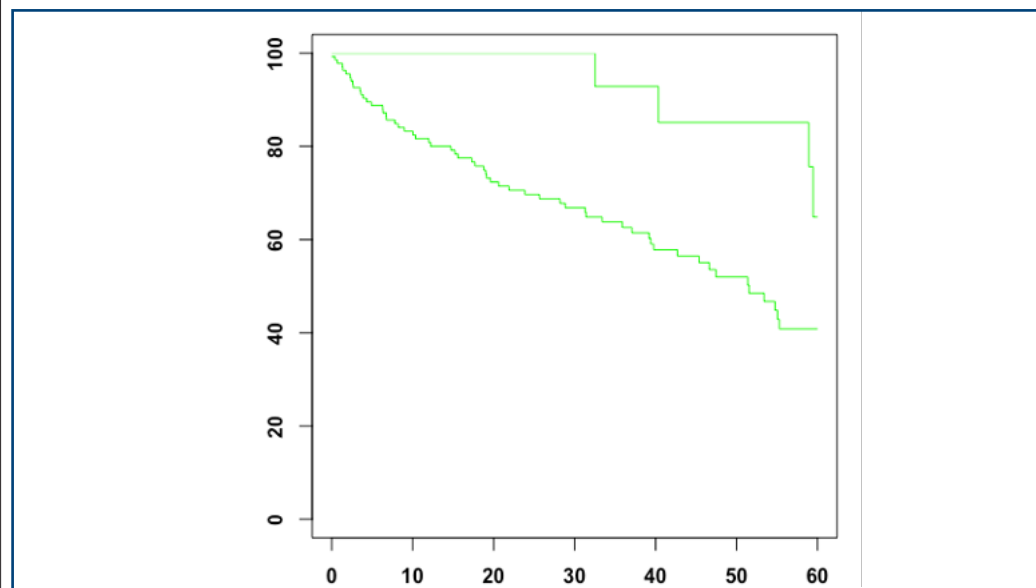
Over a period of 13 years, 25 cases of peritonitis were counted in the PKR group, i.e. an average free interval between two episodes of 36.18 months (months x patients / peritonitis) and a rate of 0.43 events / year. In the non-PKR group, 179 cases of peritonitis was noted, i.e. a rate of 0.41 events / year.

The technique failure rate was 20% in the PKR group versus 17.6% in the non-PKR group, but this difference was not significant (p: 0.24). In univariate analysis, only peritonitis was associated with failure of the technique in PKR patients (p: 0.006; confidence index 99%) (Table IV).

↓ Table IV. Predictors of technique failure in the PKR group

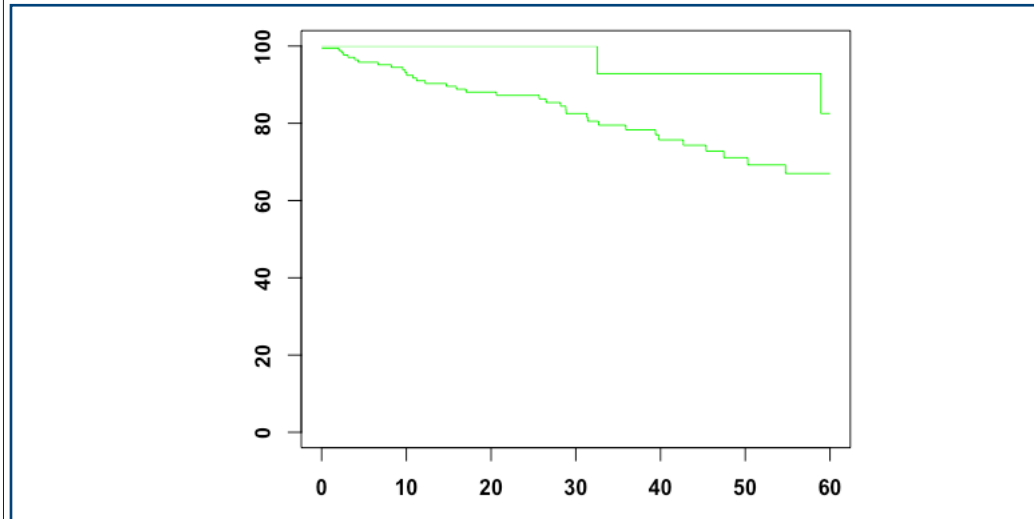
	OR	p
Age at start< at 50 years	0.85	0.77
Peritonitis	7.5	0.006
Hernia	0.32	0.57
Pleuropulmonary leaks	1.31	0.287

The technical survival rate was 93% ± 7 in PKR versus 57% ± 4 in non-PKR; this difference was significant: p = 0.02 (figure 2). A comparison of the PKR group and the non-diabetic non-PKR group shows that technical survival remained significantly better in PKRs (p = 0.02). An adjustment of the survival calculations on age, renal function and comorbidities was not carried out, the small number of subjects included not allowing it, but no risk factor for failure of the technique appeared at this stage of PKR.



↑ Figure 2. Technical survival curves in the PKR and non-PKR group

The patient survival rate was $93\% \pm 7$ in PKR versus $78\% \pm 34$ in non-PKR patients, but this difference was not significant: $p = 0.06$ (Figure 3).



↑ Figure 3. Patient survival at 3 years in the PKR and non-PKR group

In univariate analysis, no factor was correlated with the mortality of PKR patients (Table V).

↓ Table V. Predictors of mortality in the PKR group

	OR	p
Hypo-albuminemia	0.96	0.32
Peritonitis	1.75	0.18
Hernia	0.63	0.42
Pleuropulmonary leaks	0.38	0.53

DISCUSSION

Polycystic kidney disease is an inherited kidney disease responsible for ESRD in 3% to 10% of cases [3,4]. The prevalence of polycystic kidney disease in our series was 8.9%. PKR is predominant in men, and it affects all ethnicities [8]. The same was true of our series, where there was a clear male predominance.

The course of renal failure in PKR is gradual, and approximately 70% develop ESRD between their fourth and seventh decade of life [9-11]. In our series, the median age at onset of dialysis in PKR patients was 56 years.

The RRF is an independent factor of patient survival and reduction in mortality in patients treated with PD [12]. In our series, PKR was associated with a preserved RRF for 5 years of evolution, but it was not a predictor of the survival of PKR patients. In the literature, the parameters of PD adequacy were similar in PKRs and non-PKRs [13-15]. In our series, PKR was associated with a better quality of dialysis thanks to the persistence of RRF after 3 years of PD.

PKR has been identified as a risk factor for hernias and pleuropulmonary leaks due to the large renal volume responsible for increased intra-peritoneal pressure [16]. Another study demonstrated

two predictors of mechanical complications in PKR patients: the CAPD technique and a high BMI [17]. In our series, PKR was also correlated with the occurrence of hernias, but no predictive factor was identified. Del Peso et al. [16] found that PKR patients with PD had a risk of infection four times greater than that of non-PKR patients; this may be explained by the higher incidence of diverticulosis in PKR compared to the general population [18], or by increased intraperitoneal pressure [19]. In our series, there was no significant difference between the rate of peritonitis in the PKR and non-PKR groups.

In the literature, the survival of PKR patients is better than that of non-PKR patients [14-18]; in our series, there was no significant difference. This can be explained by the young age and the low incidence of comorbidities in PKR [20]. According to the EDTA registry [21], the mortality of PKR patients in PD decreased from 53% to 29% (a 44% decrease), while it went from 44% to 35% (a 20% decrease) in non-PKR PD patients. This improvement in survival was essentially correlated with the decrease in the incidence of cardiovascular disease. In our series, mortality in the PKR group was 20%, versus 22.7% in the non-PKR group.

Kumar et al.'s [13] study of a cohort of 56 PKR PD patients over a 12-year period found that the long-term survival of the technique was similar to that of a non-PKR, non-diabetic matched control group. In a study including 33 PKR patients and 66 non-PKR patients, technical survival was 53.7 months in the PKR group, versus 39.4 months in the non-PKR group [14]. In our series, technical survival in PKR was significantly better than that of non-PKR patients, which is consistent with the data in the literature.

CONCLUSION

This study demonstrates that PD is an extra-renal purification modality that can be offered as a first-line treatment in our PKR patients, as in the series published previously on different populations. A comparative study between PD and hemodialysis in PKR is necessary to demonstrate the benefit of PD in this population.

The limits of the study

Total renal volume has not been calculated for all patients, and the impact of intraperitoneal pressure on the occurrence of mechanical complications (pleuropulmonary leaks, hernia) has not been specified.

CONFLICT OF INTEREST

The authors declare no conflict of interest for this article.

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