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Reasons for transfer from hemodialysis to peritoneal dialysis and patient outcomes in a Sub-Saharan environment: Example of the Aristide Le Dantec University Hospital in Dakar

(Motifs et devenir des patients transférés de l'hémodialyse à la dialyse péritonéale en milieu subsaharien : exemple du CHU Aristide Le Dantec de Dakar)

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Summary

Introduction:

Literature is scarce regarding patients with end-stage renal disease who are initially treated with chronic hemodialysis and are then transferred to peritoneal dialysis. The aims of this study were to evaluate the reasons the transfer from hemodialysis and to monitor patient outcomes in peritoneal dialysis.

Patients and Methods:

This retrospective, descriptive and analytical study covering 17 years was conducted at the peritoneal dialysis unit of the Aristide Le Dantec University Hospital. Included were patients over 18 years of age in chronic hemodialysis for at least 3 months who were then transferred to peritoneal dialysis. Data were collected from medical records.

Results: Data were collected on 26 patients. The average age at initiation of peritoneal dialysis was 52.19±15.37 years. The sex ratio was 0.62. The main causal nephropathy was hypertensive nephropathy (46.2%). The reasons for transfer were personal choice (50%), vascular access problems (42.3%), hemodynamic intolerance (3.8%) and cardiovascular instability (3.8%). Patient outcomes were as follows: 52.2% of patients died, 43.5% returned to hemodialysis and 4.3% underwent a kidney transplant. The average survival was 503,000±108,343 days. Female gender and transient vascular access were risk factors for mortality of transferred patients (OR=0.043 95% CI [1.085; 148.243] p=0.045) and (OR=0.047 95% CI [1.035; 112.840] p=0.048), respectively.

Conclusion: The transfer from hemodialysis to peritoneal dialysis must be anticipated in our context to reduce the morbidity and mortality of our patients on chronic dialysis.

Keywords: hemodialysis, patient transfer, peritoneal dialysis, survival

Résumé

Introduction :

Peu de données sont disponibles dans la littérature concernant les patients en insuffisance rénale terminale traités initialement par hémodialyse chronique puis transférés en dialyse péritonéale. Le but de cette étude était d'évaluer les motifs de transfert des patients de l'hémodialyse chronique à la dialyse péritonéale et suivre leur devenir en dialyse péritonéale.

Patients et Méthodes :

Il s'agit d'une étude rétrospective, descriptive et analytique sur 17 ans au niveau de l'unité de dialyse péritonéale du CHU Aristide Le Dantec. Étaient inclus, les patients de plus de 18 ans en hémodialyse chronique pendant au moins 3 mois, puis transférés en dialyse péritonéale. Les données ont été collectées à partir des dossiers médicaux.

Résultats : Vingt-six patients ont été colligés. L'âge moyen à l'initiation de la dialyse péritonéale était de 52,19±15,37 ans. Le sex-ratio était de 0,62. La principale néphropathie causale était la néphroangiosclérose (46,2%). Les motifs de transfert étaient le choix personnel (50%), les problèmes d'abord vasculaires (42,3%), l'intolérance hémodynamique (3,8%) et l'instabilité cardiovasculaire (3,8%). Concernant le devenir : 52,2% des patients étaient décédés, 43,5% remis en hémodialyse et 4,3% transplantés rénal. La moyenne de survie était de 503,000±108,343 jours. Le sexe féminin et l'abord vasculaire transitoire étaient des facteurs de risque de mortalité des patients transférés (OR=0,043 IC à 95% [1,085 ; 148,243] p=0,045) et (OR=0,047 IC à 95% [1,035 ; 112,840] p=0,048) respectivement.

Conclusion : Le transfert de l'hémodialyse vers la dialyse péritonéale doit être anticipé dans notre contexte pour réduire la morbi-mortalité de nos patients sous dialyse chronique.

Mots-clés : dialyse péritonéale, hémodialyse, survie, transfert des patients



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Introduction

Peritoneal dialysis (PD) and hemodialysis (HD) are two complementary extrarenal dialysis techniques [1]. Patients treated with PD appear to have a better quality of life and satisfaction, with equivalent or better survival than those treated with HD, at least during the first two years [2, 3, 4]. The main limitations of HD are vascular access problems, cardiovascular instability, and hemodynamic intolerance during the HD session as well as the patient's personal choice to switch to PD [1,5]. PD is most often chosen as a "backup" method of extrarenal dialysis (EAD) when patients are at the end of a long period on HD [1].

The transition from PD to HD is relatively common and has been the subject of several publications. In contrast, data are limited regarding patients with end-stage renal disease (ESRD) who are initially treated with chronic HD and then transferred to PD [6]. In the Netherlands, for example, transfers from HD to PD are three times less frequent than transfers from PD to HD [7].

Chronic PD is not widely used in sub-Saharan Africa for patients with ESRD although it has been available in Senegal since 2004 [8, 9]. Moreover, data on the transition of patients from HD to PD are scarce in this part of the continent. Thus, the aim of this study was to evaluate the reasons for patients being transferred from HD to PD in Senegal and to monitor the fate of these PD patients.

Patients and Methods

This is a retrospective, descriptive and analytical study covering a 17-year period (March 31, 2004 to December 31, 2021) based on patient medical records from the only PD unit in Senegal, located in the nephrology department of the Centre Hospitalier Universitaire Aristide Le Dantec de Dakar (CHU-ALD). The cut-off date was June 30, 2022.

The PD unit was inaugurated on March 31, 2004, and is divided into a patient waiting room, medical consultation room, nurses' room, archive room, and PD training room. The study population underwent conventional hemodialysis comprising three four-hour sessions per week. The dialysis membrane used was polysulfone.

We included patients over 18 years of age who had been in chronic HD for at least 3 months and were then transferred to the PD unit. Patients whose records could not be used due to lack of data as well as patients who were lost to follow-up were excluded.

Data were collected on a data processing form based on medical records.

The following data were collected:

- Epidemiological data: age at transfer to PD, gender, initial nephropathy. Existence of comorbidity at the time of transfer to PD was investigated. The Charlson comorbidity score was calculated at PD initiation.
- HD data: length of stay (in months), vascular approach used, duration in HD, existence of an RIF calculated from the mean of the sum of urea and creatinine clearances, assessed on a 24-hour urine collection.
- PD data: reason for transfer, circumstances of PD initiation (scheduled, emergency), start of exchanges after PD catheter placement (in days), PD modality and patient autonomy.
- Data at point date: length of stay in PD (in months) at point date (June 30, 2022); fate of patients

after transfer to PD: deceased, renal transplant, returned to HD or still in PD.

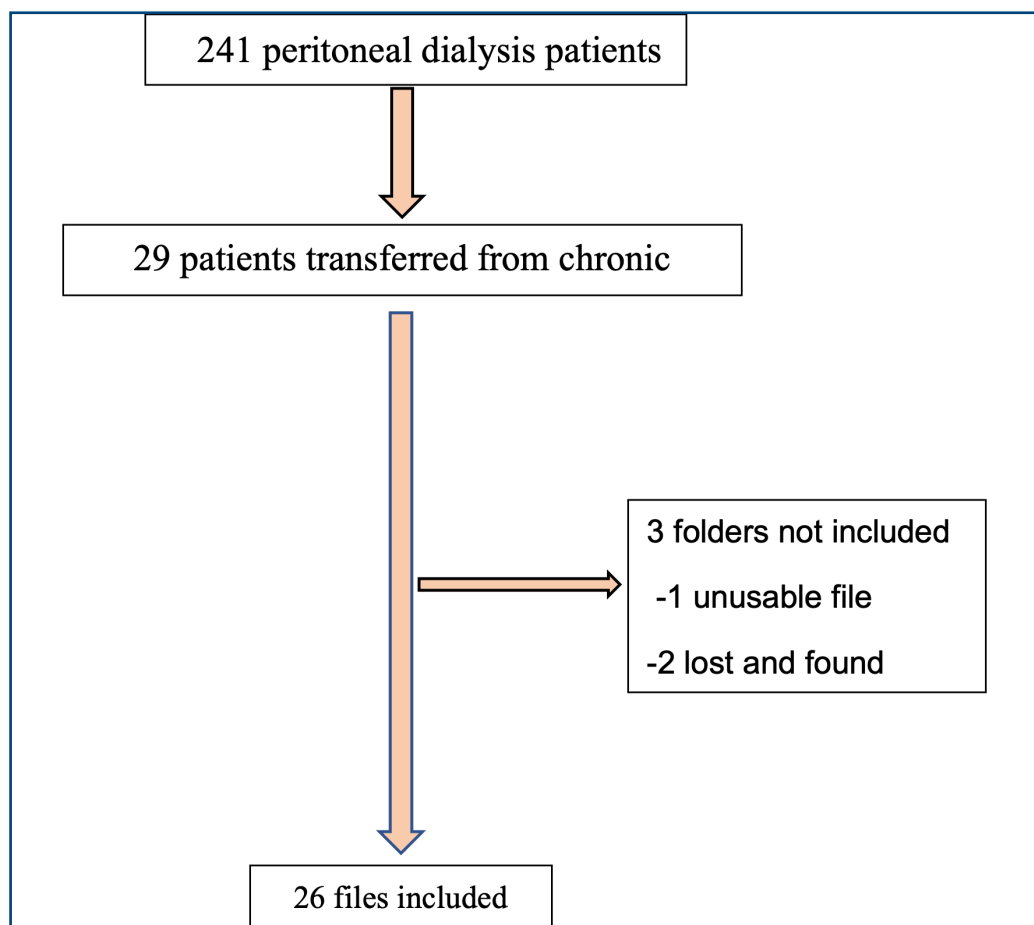
The survival of PD patients was evaluated. We collected the completed forms and filed them in a dedicated binder.

Data were collected on a pre-established form, entered in Excel, and analyzed using SPSS (*Statistical Package for Social Sciences*) Statistics version 25. Data were expressed using measures of central tendency and dispersion (means \pm standard deviation or median) for quantitative variables, and frequencies for qualitative variables. Data comparison was carried out using the chi-square test and Student's t-test (or a Mann-Whitney test), depending on the type of variable. Logistic regression was used to determine mortality risk factors.

The probability of survival for the entire duration of post-transfer follow-up in PD was estimated using the Kaplan-Meier method. The Cox regression model was used to investigate the factors that may have affected survival, and the assumption of proportionality in the Cox model was assessed using graphical methods. A p-value of less than 0.05 was considered significant.

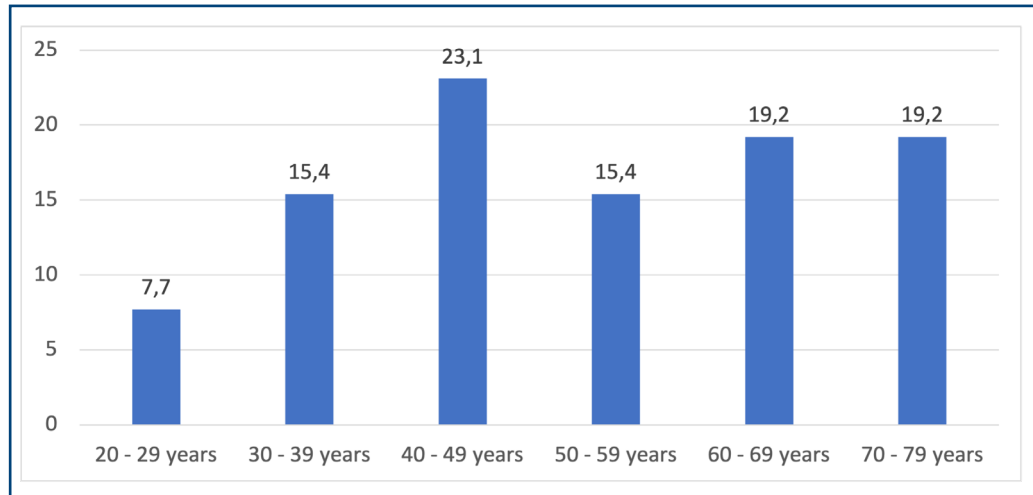
Results

Two hundred and forty-one (241) patients were placed on PD at CHU-ALD, of whom 29 (12.03%) were transferred after completing 3 months of chronic HD (*figure 1*).



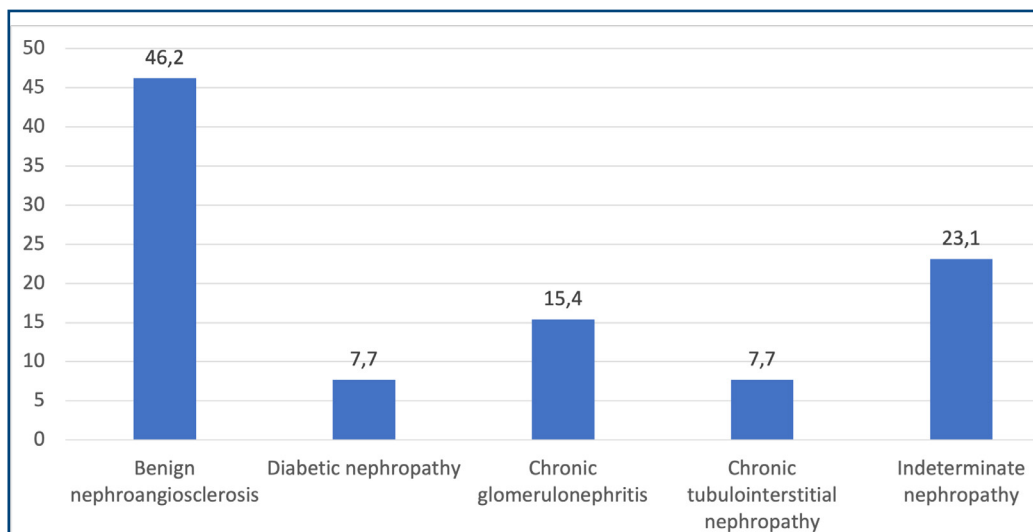
↑ Figure 1. Flow chart of patients transferred from HD to PD

The mean age of patients was 52.19 ± 15.37 years, with extremes of 25.00 and 79.00 years. The majority of patients were in the 40–49 age bracket (23.1%) (figure 2).



↑ Figure 2. Distribution of the 26 patients transferred according to age at PD initiation

Females predominated, with a sex ratio of 0.62. Nephroangiosclerosis (NAS) was the most common nephropathy (46.2%), followed by undetermined nephropathies (23.1%) (figure 3).



↑ Figure 3. Distribution of the 26 patients transferred according to initial nephropathy

Hypertension was the most frequent comorbidity and was present in 24 patients (92.3%), followed by diabetes in 4 patients (15.4%), and dyslipidemia in one patient (3.8%). The patients' mean Charlson index at transfer to PD was 4.81 ± 1.81 .

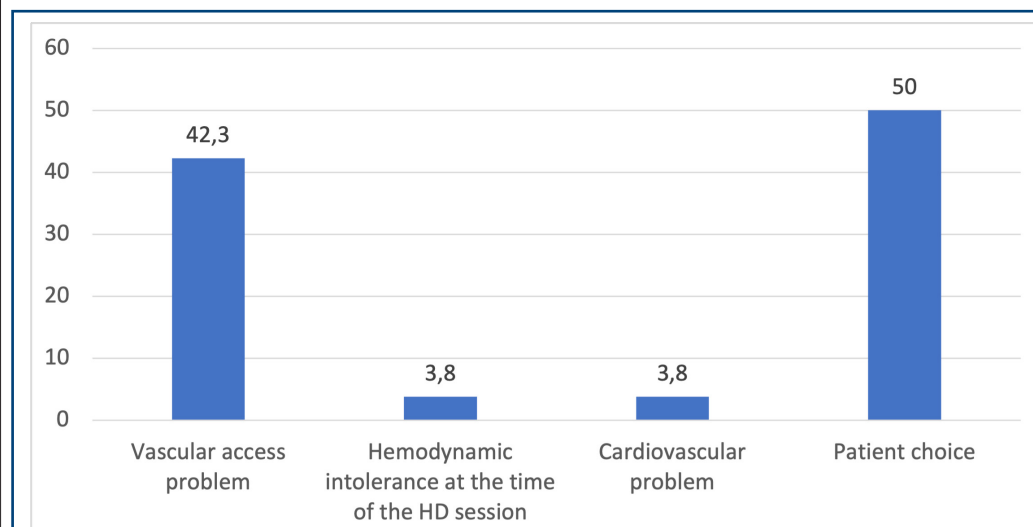
Only 7.7% of patients had started hemodialysis on a native arteriovenous fistula (AVF). The other patients had had either a transient (34.6%) or a transient and then permanent approach (57.7%). The mean Kt/V was 1.44 ± 0.22 . The mean duration of hemodialysis was 28.85 ± 32.74 months, with extremes of 3 and 120 months. Seventeen (17) patients were transferred after less than 24 months in HD (65.4%) (table 1).

↓ Table 1. Length of stay of the 26 HD patients by age group

Duration in HD (months)	Workforce	Percentages
≤ 24	17	65.4
25–48	4	15.4
49–72	2	7.7
73–96	2	7.7
97–120	1	3.8

Twenty-four patients (92.3%) had a mean RIF of 4.53 ± 2.05 ml/min, with extremes of 2.06 and 8.00 ml/min. The majority of patients (57.6%) came from the Dakar region and 42.4% were from other regions.

The most frequent reason for transfer was personal choice, which was the case for 13 patients (50.0%), followed by vascular access problems (hemodialysis vascular impasse) for 11 patients (42.3%) (figure 4). The personal choice was related to professional activity, the non-existence of hemodialysis in the place of residence, and the absence of social security to continue private hemodialysis due to a lack of available space in the public sector. Concerning the circumstances surrounding PD initiation, 18 patients (69.2%) were admitted due to an emergency situation, compared with 30.8% who were scheduled for PD. Of the emergency PD patients, 11 had vascular impasses and 7 chose PD for personal reasons (including 5 for reasons of distance from the HD center and financial problems). Among the scheduled patients, six were related to personal reasons, one to cardiovascular instability, and one to hemodynamic intolerance.



↑ Figure 4. Representation of the 26 patients according to the reasons for transfer to PD

The start of exchanges after PD catheter placement was 7.22 ± 6.50 days, with extremes of 1 and 28 days. Eighteen patients started exchanges at under 14 days (78.3%) and 5 patients (21.7%) from day 14 onwards. A total of 23 patients (88.5%) were on CAPD, and 3 patients (11.5%) were on APD. Nineteen patients (73.1%) were self-sufficient in PD, and for the remainder of patients exchanges were performed by a family member.

At the reporting date, the mean duration of PD was 10.00 ± 10.81 months, with extremes of 1 and 36.00 months. The majority of patients had spent at least 5 months in PD (57.1%).

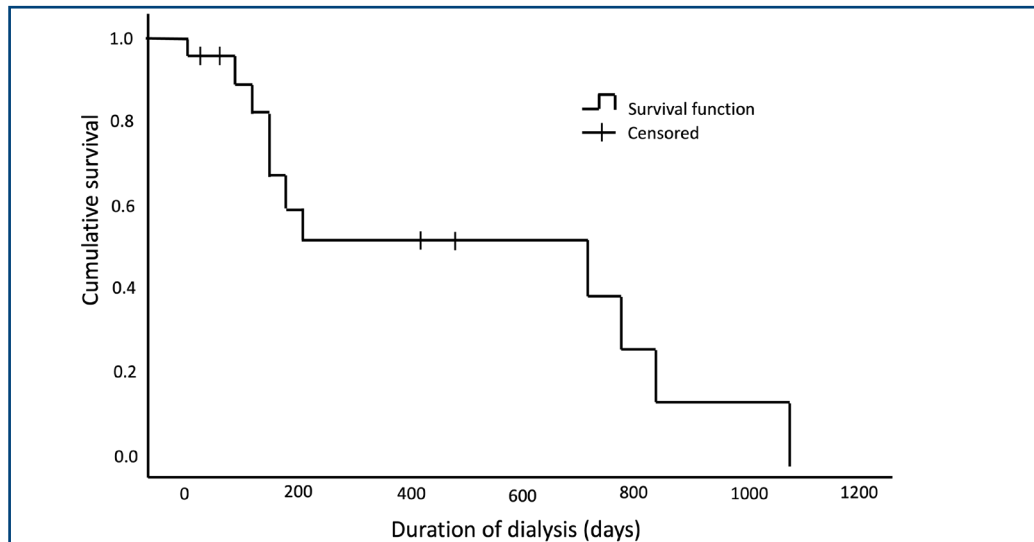
Concerning the status of patients after transfer to PD, 12 (52.2%) died; 10 (43.5%) were transferred back to HD, including 2 cases of isolated refractory peritoneal infections, a multi-resistant PI, and 7 due to personal choice. One patient (4.3%) underwent a kidney transplant. Ten deaths (75%) were unrelated to PD: 6 were from an unknown cause, 2 were related to sepsis with an unknown entry point, 1 was a pulmonary embolism, and 1 was a case of intestinal obstruction. Two deaths were related to PD (16.67%) in the context of peritoneal infection.

Univariate analysis using binary logistic regression showed that female gender was a factor associated with mortality ($p=0.045$ OR=0.043 95% CI [1.085; 148.243]), as was the transient vascular approach ($p=0.048$ OR=0.047 95% CI [1.035; 112.840]) (table 2).

↓ Table 2. Univariate binary logistic regression analysis of mortality risk factors

Variabes	p	OR
Age		
At the start of PD	1.000	1.000
Gender	0.045	0.079
Initial nephropathy		
Nephroangiosclerosis	1.000	1.000
NTIC	1.000	1.000
Diabetic nephropathy	1.000	1.000
CNG	0.544	2.200
Nephropathy indeterminate	1.000	1.000
PD history		
HTA	1.000	1.000
Diabetes	0.999	0.000
Hypercholesterolemia	1.000	1.762
Chronic obstructive pulmonary disease	1.000	1.762
Chronic liver disease	1.000	0.000
Cardiovascular disease	1.000	0.000
Charlson Index		
≤ 5	1.000	
> 5	1.000	
Transfer patterns		
Vascular access problems	0.682	1.400
Patient selection	1.000	1.000
Hemodynamic intolerance	1.000	0.000
Cardiovascular instability	1.000	1.762
Residual renal function	1.000	1.000
Vascular approaches used		
Transient	0.048	0.093
Permanent	0.999	1.938
Terms and conditions		
APD	0.544	2.200
CAPD	0.544	0.455
Duration in PD		
First year in PD	0.332	0.296
Second year in PD	0.999	2.307

Multivariate analysis showed that female gender (OR: 0.079; CI: [1.085–148.243]) and transient vascular approach (OR: 0.093; CI: [1.035; 112.840]) were predictive of mortality. Mean Kaplan Meier survival was $503,000 \pm 108,343$ days, with a median of $720,000 \pm 383,318$ days. Survival at 210 days was 51% (figure 5).



↑ Figure 5. Kaplan-Meier patient survival curve

For the Cox regression model, we crossed patient survival with the following factors: age at initiation of PD, history in PD, and RIF. Together, these factors did not significantly affect patient survival (p-value = 0.884).

We calculated the Hazard ratio, which was 1.597 (95% CI [0.329–7.757]) for female gender, and 1.975 (95% CI [0.408–9.552]) for transient vascular approach; with a p-value of < 0.005. This shows that these parameters have a major influence on the mortality of transferred patients.

Discussion

Transfer from HD to PD is an infrequent event in the population of dialysis centers that were included in our study. This is in line the data in some of the literature [6,10].

The meta-analysis by Jin Wang et al. showed that the sample size of patients transferred from HD to PD ranged from 28 (41.17%) to 3757 (7.02%) [6]. The low prevalence in our study compared with other studies may be explained by the monocentric nature of our study and the size of our sample.

The young age of our patients transferred to PD can be interpreted by the easy acceptance of this treatment modality owing to its many advantages: maintenance of a certain degree of independence, better quality of life than with HD, and better professional reintegration [11]. The Australian and New Zealand study by Anh Nguyen et al. found that age > 50 years was a major predictor of mortality in patients transferred to PD (p < 0.001) [12]. In our study, we found no relationship between age at initiation of PD and mortality (p = 1.000).

Nephroangiosclerosis was the main cause of nephropathy in our patients. Its predominance is

related to the high prevalence of hypertension in the general population in Senegal and the notion of genetic predisposition in Black subjects [13].

The mean length of stay for HD patients was 28.85 ± 32.74 months, with extremes of 3 months and 120 months. In the meta-analysis by Jin Wang et al., the length of stay in HD varied considerably from one study to another, ranging from a minimum of 3 months to 284 months [6]. This disparity between studies may be linked to the difficult assessment of the ideal time for transfer. This requires a certain amount of experience on the part of the practitioner as well as listening to the patient.

Twenty-four patients had a RIF (92.3%). This value is similar to that of Lobbedez et al., who showed that 18 out of 20 patients had a RIF [10]. According to Imbeault et al., RIF is known to influence survival in PD [14]; this was not the case in our study ($p=1.000$). This finding is probably due to the small sample size.

The most frequent reason for transfer was personal choice (50.0%), followed by vascular access problems (42.3%). In our context, the social reasons could be explained by the long distance that patients had to travel to undergo HD sessions at the centers, with transport at the patient's expense, and the high cost of the HD session in the long term (for those who were in private centers). This result is similar to that of the study by Nguyen et al. in 2019, which showed that the main reason for transfer was patient choice (63.8%), followed by vascular access problems (6.6%) and cardiovascular instability (0.9%) [12]. Furthermore, Hamida et al. showed that out of 20 patients transferred, depletion of venous capital was the reason for transfer to PD in all patients [15]. Lobbedez et al. found that: 13 patients (52%) were transferred because of problems with their vascular access (recurrent thrombosis, hyper-flow with digital necrosis or non-development linked to the vascular network); 7 patients (28%) were transferred because of hemodynamic intolerance of HD; and 5 patients (20%) chose the PD technique after a period in HD [10]. In the included studies by Jin Wang et al., the causes of transfer from HD to PD were vascular access problems (6.6%–64%), cardiovascular instability (0.9%–57.12%), and patient preference (10.7%–63.8%) [6].

The majority of our patients were transferred to PD in emergency situations, which is why we need to make our colleagues in Senegal aware of the importance of anticipation in this context. Mortality for our patients was 52.2% after a mean duration of 393.09 ± 379.88 days from initiation of PD. Some studies show that patients transferred from HD to PD have a higher mortality risk than those who remained on their initial dialysis modality (8,36,45), and this effect has been observed for up to 2 years on HD [12]. In the multicenter study by Anh Nguyen et al., the cumulative incidences of death at 1, 3 and 5 years were 19%, 45.8% and 63.8%, respectively [12].

Kaplan Meier survival was $503,000 \pm 108,343$ days. This may be explained by the worsening of an underlying chronic pathology or by the addition of a pathology that did not exist during the HD and PD stay.

Conclusion

PD is an extrarenal purification technique that complements hemodialysis. In our context, the transfer from hemodialysis to PD is essentially linked to the patient's personal choice, followed

by problems of vascular access. This transfer should be programmed to ensure that the technique runs smoothly and lasts, especially as PD centers are currently opening in the regions of Senegal.

Conflict of interest

The authors have no conflict of interest to declare.

Authors' contributions

Conception and validation of the study: Lemrabott AT, Niang A, Ka EF.

Drafting and correction of the article: Lemrabott AT, Keïta N, Etok A, Faye M, Relecture: Faye Mo, Ba B, Mbengue M, Diagne S.

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