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From Chronic Hemodialysis to Peritoneal Dialysis: Between Informed Choice and Vascular Access Constraint

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Abstract

Introduction: The transfer from hemodialysis (HD) to peritoneal dialysis (PD) may result from either a rescue strategy in cases of vascular access exhaustion or a planned, patient-centered transition. The impact of the context and timing of this transfer on prognosis remains insufficiently documented. **Methods:** We conducted a retrospective, single-center, descriptive and analytical study including patients treated with HD for at least 3 months and subsequently transferred to PD, provided that they had completed at least six months of follow-up on PD. Demographic, biological, adequacy parameters, complications, and survival data were analyzed. Patients were divided according to the indication for transfer: vascular access failure versus patient choice. **Results:** Among 257 patients followed on PD, 31 were included. The mean age at initiation of PD was 46.5 ± 17.6 years, with a male-to-female ratio of 0.94. Transfer to PD was motivated by patient choice in 51.6% of cases and by vascular access failure in 48.4%. The median duration of HD before transfer was significantly longer in the vascular access exhaustion group ($p = 0.015$). These patients also presented with hypoalbuminemia, more severe anemia, and significantly lower residual renal function at PD initiation ($p = 0.008$, $p = 0.019$, and $p = 0.004$, respectively). Peritoneal leaks were more frequent in this group ($p = 0.025$). Overall mortality was significantly higher in the vascular access failure group ($p = 0.007$), with lower overall survival ($p = 0.016$), but no significant difference in technique survival. **Conclusion:** The prognosis following transfer from HD to PD appears to be strongly associated with the patient's clinical status at the time of transition. Vascular access exhaustion may be a marker of advanced vulnerability and is associated with increased mortality. These findings underscore the importance of timely transfer, before the loss of residual renal function and exhaustion of vascular access options.

Keywords

Peritoneal Dialysis, Hemodialysis, Vascular Access Exhaustion, Modality Transition, Survival

1. Introduction

Hemodialysis (HD) remains the predominant renal replacement therapy (RRT) modality worldwide among patients with end-stage kidney disease (ESKD) [1]. Peritoneal dialysis (PD), although effective and associated with comparable overall survival, continues to be underutilized across many healthcare systems [2], partly reflecting organizational constraints and heterogeneity in practice patterns. Rather than representing competing modalities, HD and PD should be viewed as complementary components of a dynamic and individualized treatment pathway for patients with ESKD. Within this framework, transitions between modalities constitute a critical aspect of care.

Whereas transitions from PD to HD have been extensively described, the reverse transition—from HD to PD—remains relatively underexplored [3]. However, such a shift may be clinically indicated in a range of settings. From a medical standpoint, vascular access exhaustion precluding the creation of a functional access (arteriovenous fistula), hemodynamic instability, as well as contraindications to heparin or thromboembolic disorders complicating anticoagulation, may limit the feasibility of HD. In addition, social and logistical considerations, including geographic distance from HD facilities, may favor home-based PD, alongside patient preference [4]. Current guidelines underscore the importance of individualized RRT planning, as reflected in the "ESKD Life-Plan" concept [5], in which PD occupies a central role, particularly in patients with limited vascular access or significant logistical constraints. The present study aims to identify the principal drivers of transfer from HD to PD, to characterize the demographic and clinicobiological profiles of these patients, and to evaluate both technique survival and overall survival since the establishment of our center.

2. Materials and Methods

2.1. Study Design and Population

This was a single-center, retrospective, descriptive, and analytical study conducted in the PD unit of the Department of Nephrology-Dialysis-Renal Transplantation at Ibn Sina University Hospital, Rabat, Morocco, between January 2006 and December 2025.

2.2. Inclusion and Exclusion Criteria

We included all patients initially treated with conventional chronic HD for at least three months and subsequently transferred to PD, provided that they had com-

pleted at least six months of follow-up on PD. Therefore, patients who died, permanently returned to HD, or were lost to follow-up before six months were not included. This inclusion criterion was applied to ensure sufficient clinical and biological follow-up; however, it may have introduced a survival bias, which was acknowledged in the limitations section.

Patients with incomplete or non-exploitable medical records due to missing data were excluded from the study.

2.3. Variables and Definitions

Data were collected from the French-language Peritoneal Dialysis Registry (RDPLF) and supplemented by review of medical records. The variables analyzed included demographic characteristics, notably age at the time of transfer to PD, sex, and educational level, which was categorized into four groups: no formal education, primary, secondary, and higher education. Clinical parameters included body mass index (BMI) and the Charlson comorbidity index.

For each patient, the transition from HD to PD was systematically analyzed:

- HD-related variables: total duration on HD (expressed in months) and type of the last vascular access used.
- Transfer to PD: indication for transfer, PD catheter insertion technique, circumstances of PD initiation (planned or unplanned), and the interval between catheter insertion and initiation of dialysis exchanges (expressed in days).

Planned PD initiation was defined as the start of dialysis exchanges after a catheter healing period exceeding 14 days following insertion, in accordance with international recommendations [6].

Urgent-start PD was defined according to the International Society for Peritoneal Dialysis (ISPD) recommendations, distinguishing [6] [7]:

Urgent-start PD: initiation of dialysis exchanges ≤72 hours after catheter insertion.

Early-start PD: initiation of dialysis exchanges between 3 and 14 days after catheter insertion.

- PD-related variables included the dialysis modality: continuous ambulatory peritoneal dialysis (CAPD) or automated peritoneal dialysis (APD), and the patient's level of autonomy.
- Biological parameters: Patients' biological profiles were assessed at PD initiation (baseline, T0), at month 6 (M6), month 12 (M12), and thereafter according to clinical course. The evaluated parameters included mineral and bone metabolism parameters (serum calcium, phosphate, parathyroid hormone [PTH], and alkaline phosphatase levels [ALP]), nutritional parameters (serum total protein, albumin, hemoglobin, and normalized protein catabolic rate [nPCR]), and adequacy parameters (residual renal function [RRF] and weekly renal and peritoneal Kt/V).

Residual renal function (RRF) was defined as the remaining native kidney function after PD initiation and was assessed using residual renal clearance when avail-

able. Weekly Kt/V was used as an index of dialysis adequacy and included peritoneal and residual renal components when measured. Autonomy status referred to the patient's ability to perform PD exchanges independently after training. Assisted PD was defined as peritoneal dialysis performed with the help of a family member, caregiver, or healthcare professional.

The indication for transfer from HD to PD was determined retrospectively through a collective review of the RDPLF registry data and patients' medical records by the nephrology team. When several reasons for transfer were documented, the main indication retained for classification was the predominant clinical reason discussed by the medical team at the time of transfer. Patients were then classified into two groups: the vascular access exhaustion group and the patient choice group.

Patients were categorized into two groups according to the indication for transfer from HD to PD:

"Vascular access exhaustion" group: included patients with documented inability to maintain or establish a functional vascular access allowing adequate HD. This definition was based on the criteria described in the 2019 KDOQI guidelines [8].

"Choice" group: included patients who did not meet criteria for vascular access exhaustion and for whom transfer to PD resulted from a shared decision between the patient and the medical team, based on logistical considerations, level of treatment autonomy, and social factors. This classification was consistent with the principles of "shared decision-making" and "patient-centered dialysis modality selection" recommended by KDIGO [9].

2.4. Statistical Analysis

Clinical and biological data were analyzed using JAMOVI software (version 2.3.21.0). Quantitative variables were expressed as mean ± standard deviation (SD) or median [interquartile range, IQR], as appropriate, and qualitative variables as counts (percentages). Between-group comparisons were performed using Student's t-test or the Mann-Whitney U test for continuous variables, and the chi-square test or Fisher's exact test for categorical variables, as appropriate. Longitudinal changes in repeated biological parameters were assessed using Friedman's test. Overall survival and technique survival were analyzed using Kaplan–Meier curves and compared with the log-rank test. Factors associated with mortality were explored using univariate logistic regression. A two-sided p-value < 0.05 was considered statistically significant.

For survival analyses, the time origin was defined as the date of PD initiation. Overall survival was defined as the time from PD initiation to death from any cause. Patients alive at the end of the study period were censored at the date of last follow-up. Technique survival was defined as the time from PD initiation to permanent transfer back to HD. For technique survival analysis, permanent transfer to HD was considered the event, whereas death, kidney transplantation, ongoing

PD at the end of follow-up, and loss to follow-up were treated as censored observations.

3. Results

Between January 2006 and December 2025, a total of 257 patients with ESKD were managed in the PD unit at Ibn Sina University Hospital. Among them, 37 patients (14.4%) were transferred to PD after at least three months of maintenance HD. Six patients were excluded due to non-exploitable medical records, and 31 patients were ultimately included in the analysis (Figure 1).

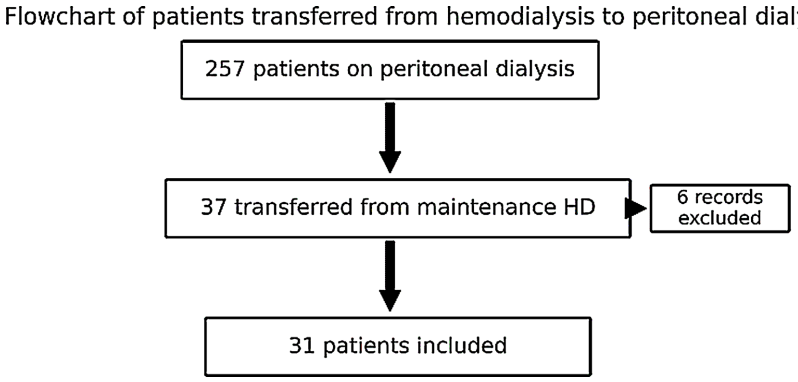

Figure 1. Flowchart of patients transferred from hemodialysis to peritoneal dialysis.

The mean age of patients at PD initiation was 46.5 ± 17.6 years (range: 14 - 78 years). The age distribution is presented in Figure 2. Sex distribution was overall balanced, with a male-to-female ratio of 0.94.

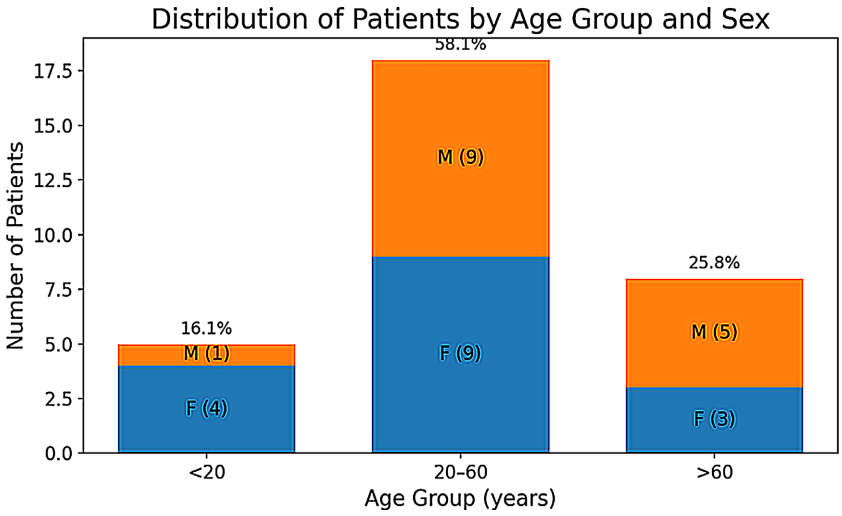

Figure 2. Distribution of patients according to age groups at the time of peritoneal dialysis initiation.

Most patients had a higher education level (42%), while eight patients (25.8%) had a secondary level, five patients (16.1%) had a primary level, and the remaining five were uneducated. Patients were referred from several regions across the King-

dom of Morocco. Half of the cohort originated from the Rabat area, located in central Morocco (16 cases, 51.6%). Notably, some patients traveled more than 200 km to reach our PD center for regular follow-up and consultations, reflecting the limited availability of specialized facilities in their regions of origin. Northern Morocco was the second most represented area, accounting for 6 patients (19.4%) (Figure 3).

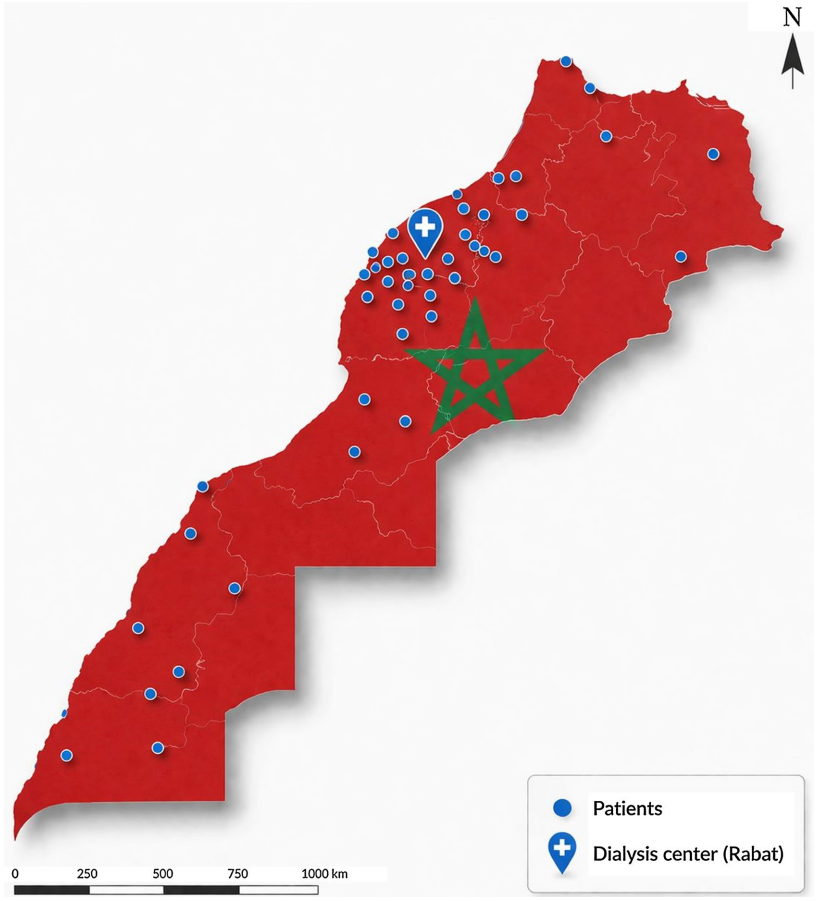

Figure 3. Geographic distribution of patients.

Diabetic nephropathy and nephroangiosclerosis (NAS) were the most common causes of ESKD, each observed in 6 patients (19.4%). Tubulointerstitial nephropathy was identified in 5 patients (16.1%), while glomerular disease accounted for 4 cases (12.9%). Only one patient had polycystic kidney disease. The etiology of ESKD remained unknown in nearly one-third of patients (9 cases, 29%). Regarding comorbidities, hypertension was the most frequent, found in 20 patients (64.5%), while diabetes was observed in 6 patients (19.4%). Underlying heart diseases were reported in 11 patients (36.7%): hypertrophic cardiomyopathy was the most common (5 cases, 45.5%), followed by ischemic heart disease (4 cases, 36.4%). Dilated cardiomyopathy and heart failure were each reported in one patient (9.1%).

Patient choice was the main reason for transfer to PD, accounting for 16 patients, whereas it was secondary to vascular access failure in the remaining 15 pa-

tients (48.4%). Among the 31 patients included, PD was initiated urgently in 17 (55%). Of these, 4 patients (13%) started urgent-start PD, while 13 (42%) initiated early-start PD within 4 to 14 days. Conversely, 45% of patients started PD in a planned setting, beyond 14 days, after completion of the recommended healing period. The median time from catheter insertion to PD initiation was 17 days [2 - 105]. APD was the most commonly used modality (17 patients, 54.8%), compared with 14 patients (45.2%) treated with CAPD.

Patient characteristics were compared between the "vascular access exhaustion" group and the "choice" group (Table 1). In the vascular access exhaustion group,

Table 1. Patient characteristics at initiation of peritoneal dialysis according to transfer indication.

Variable	Overall (n = 31)	Vascular Access Exhaustion (n = 15)	Patient Choice (n = 16)	p-value
Demographic characteristics				
Age at PD initiation (years)	46.5 ± 17.7	47.1 ± 15.4	45.9 ± 19.9	0.862
Male/Female ratio	0.94	1.14	0.77	0.594
Comorbidities				
Diabetes, n (%)	6 (19.4%)	5 (33.3%)	1 (6.3%)	0.056
Hypertension, n (%)	20 (64.5%)	9 (60.0%)	11 (68.8%)	0.611
Cardiovascular disease, n (%)	11 (35.5%)	8 (50.0%)	3 (20.0%)	0.058
BMI, median [IQR]	23.00 [20.70 - 26.00]	22.75 [20.75 - 26.75]	23.40 [20.00 - 26.00]	0.810
Charlson comorbidity index, median [IQR]	2 [2 - 3]	2 [2 - 3]	2 [2 - 3]	0.088
HD-related variables				
HD duration (months)	36 [10.5 - 106.5]	49 [36 - 168]	18 [6.75 - 51]	0.015
Last vascular access, n (%)				<0.001
— Arteriovenous fistula	11 (35.5%)	0 (0%)	11 (68.8%)	
— Central venous catheter	20 (64.5%)	15 (100%)	5 (31.3%)	
PD initiation setting, n (%)				0.730
— Urgent-start PD	17 (54.8%)	9 (60.0%)	8 (50.0%)	
— Planned-start PD	14 (45.2%)	6 (40.0%)	8 (50.0%)	
PD characteristics				
PD modality, n (%)				0.200
— CAPD	14 (45.2%)	5 (33.3%)	9 (56.3%)	
— APD	17 (54.8%)	10 (66.7%)	7 (43.8%)	
Autonomy status, n (%)				0.036
— Autonomous	22 (71.0%)	8 (53.3%)	14 (87.5%)	
— Assisted	9 (29.0%)	7 (46.7%)	2 (12.5%)	

Abbreviations: BMI, body mass index; HD, hemodialysis; PD, peritoneal dialysis; CAPD, continuous ambulatory peritoneal dialysis; APD, automated peritoneal dialysis; IQR, interquartile range.

the duration of HD prior to transfer to PD was significantly longer, with a median of 49 [36 - 168] months compared to 18 [6.75 - 51] months in the choice group ($p = 0.015$). The last vascular access was a central venous catheter in all patients in this group, compared with 31.3% in the choice group ($p < 0.001$). Diabetes and cardiovascular disease were more frequent in the vascular access exhaustion group than in the choice group; however, these differences did not reach statistical significance ($p > 0.05$). In the choice group, the proportion of autonomous patients was significantly higher compared with the vascular access exhaustion group ($p = 0.036$). No statistically significant differences were observed between the two groups regarding demographic characteristics, PD initiation modalities, age at PD initiation, technique survival, or PD modality used ($p > 0.05$).

At the initiation of PD (T0), patients in the "vascular access failure" group exhibited a significantly poorer biological profile compared to those in the "patient choice" group, characterized by hypoalbuminemia ($p = 0.008$), more pronounced anemia ($p = 0.019$), and nearly absent RRF ($p = 0.004$). These findings should be interpreted as baseline differences between groups rather than causal effects of the transfer indication. Disturbances in mineral metabolism were also observed, with lower serum calcium levels ($p = 0.012$) and higher serum phosphate levels ($p = 0.023$) (Table 2).

Table 2. Baseline biological parameters (T0) according to group (patient choice vs vascular access failure).

Variable	Vascular access failure	Patient choice	p-value
Albumin (g/L)	35.00 [32 - 37]	40.50 [35.5 - 44.5]	0.008
Hb (g/dL)	9.30 [8.25 - 10.75]	12.10 [9.43 - 13.45]	0.019
Total proteins (g/L)	68 [59 - 73]	74 [69.25 - 77]	0.050
RRF (L/week/1.73m^2)	0 [0 - 0]	3.41 [0.22 - 4.38]	0.004
Calcium (mg/L)	85 [77.5 - 91]	95.5 [91.25 - 100.75]	0.012
Serum phosphorus (mg/L)	63 [57 - 72.5]	47 [32.5 - 58.5]	0.023
ALP (UI/L)	178 [118.5 - 195.5]	114 [74 - 183.5]	0.251
PTH (pg/mL)	339.5 [233 - 727.75]	283.5 [208.5 - 411]	0.448

Abbreviations: Hb, hemoglobin; RRF, residual renal function; ALP, alkaline phosphatase; PTH, parathyroid hormone.

Following the comparison of biological parameters at baseline (T0), their longitudinal changes were evaluated during follow-up. This analysis specifically focused on patients with vascular access exhaustion, a particularly vulnerable population in whom the transition to PD appears to be of critical importance (Table 3).

In the vascular access exhaustion group, laboratory data were available for all 15 patients at baseline, 6 months, and 1 year. Therefore, the longitudinal biological

analysis was performed on the complete available dataset for this subgroup, without imputation of missing data. This analysis was limited to patients with vascular access exhaustion because they represented the main population of clinical interest, corresponding to rescue PD after prolonged HD exposure and loss of vascular access options.

Table 3. Longitudinal changes in biological, nutritional, and dialysis adequacy parameters at baseline, 6 months, and 1 year in patients with vascular access exhaustion.

Variable	Baseline (T0)	6 months	1 year	p-value (Friedman test)
Albumin (g/L)	35 [32 - 37]	37.5 [35 - 39]	39.5 [38 - 41]	0.012
Hemoglobin (g/dL)	9.3 [8.25 - 10.75]	11.2 [10.8 - 11.6]	11.9 [11.5 - 12.3]	<0.001
Total protein (g/L)	68 [59 - 73]	63.5 [60.75 - 69.5]	71 [68 - 74]	0.003
Calcium (mg/L)	85 [77.5 - 91]	91 [88 - 94]	94 [92 - 96]	0.025
Phosphate (mg/L)	63 [57 - 72.5]	52 [48 - 56]	45 [42 - 48]	0.005
ALP (IU/L)	178 [118 - 195]	145 [130 - 160]	115 [100 - 130]	0.012
PTH (pg/mL)	339.5 [233 - 727]	280 [240 - 320]	250 [210 - 290]	0.021
Kt/V	1.1 [0.9 - 1.2]	1.3 [1.2 - 1.4]	1.5 [1.4 - 1.6]	<0.001
nPCR (g/kg/day)	0.85 [0.7 - 1.0]	1.05 [0.9 - 1.2]	1.25 [1.1 - 1.3]	0.008

Abbreviations: ALP, alkaline phosphatase; PTH, parathyroid hormone; Kt/V, dialysis adequacy index; nPCR, normalized protein catabolic rate.

The analysis of biological parameters assessed at baseline (T0), 6 months, and 1 year in patients with vascular access exhaustion demonstrated an overall and statistically significant improvement in clinical and metabolic status. Friedman's test, applied across all variables, confirmed significant changes in dialysis adequacy, nutritional status, and mineral metabolism markers. Dialysis adequacy improved steadily over time, with Kt/V increasing from 1.1 at baseline to 1.5 after 1 year of follow-up ($p < 0.001$). This enhancement in solute clearance was associated with a significant improvement in nutritional parameters. Median serum albumin rose from 35.0 g/L to 39.5 g/L ($p = 0.012$), while total protein reached 71 g/L at 12 months ($p = 0.003$). In parallel, nPCR, a surrogate marker of protein intake, increased progressively from 0.85 g/kg/day to 1.25 g/kg/day ($p = 0.008$), reflecting an improvement in overall nutritional status and appetite. Hematological improvement was also notable, particularly with regard to anemia correction. Mean hemoglobin levels increased significantly from 9.3 g/dL at the time of vascular access exhaustion to 11.9 g/dL at study completion ($p < 0.001$). In addition, calcium-phosphate balance and bone remodeling markers showed improved metabolic control. Serum phosphate decreased significantly from 63 mg/L to 45 mg/L ($p = 0.005$), while serum calcium stabilized within target values (94 mg/L at 1 year; $p = 0.025$). Markers of secondary hyperparathyroidism also improved, with me-

dian PTH decreasing from 339.5 pg/mL to 250 pg/mL (p = 0.021) and ALP falling from 178 IU/L to 115 IU/L (p = 0.012).

Mechanical and infectious complications, along with clinical outcomes stratified by the indication for PD initiation, are summarized in Table 4. Leakage events were significantly more frequent in the vascular access exhaustion group compared with the choice group (p = 0.025). In contrast, no significant differences were observed regarding catheter migration or catheter dysfunction. The peritonitis rate was higher in the vascular access exhaustion group (0.89 vs. 0.66 episodes per patient-year), although this difference did not reach statistical significance (p = 0.510).

Definitive transfer to HD occurred in 20.0% of patients in the vascular access exhaustion group compared with 50.0% in the choice group (p = 0.081), with peritonitis being the leading cause of transfer. At the end of follow-up, 13.3% of patients in the vascular access exhaustion group and 31.3% in the choice group remained on PD. Overall mortality was significantly higher in the vascular access exhaustion group (p = 0.007). A total of 13 deaths were recorded in the cohort. Cardiovascular causes were the leading cause of death, accounting for 5 cases (38.5%). Septic shock of non-peritoneal origin was the second most frequent cause, with 4 cases (30.8%). Pneumonia ranked third, observed in 2 cases (15.4%). Finally, one death was attributed to peritonitis.

To identify factors associated with mortality, a univariate logistic regression

Table 4. Evolution profile and complications according to the indication for initiation of peritoneal dialysis.

Parameters	Vascular Access Exhaustion Group (n = 15)	Choice Group (n = 16)	p-value
COMPLICATIONS			
Leaks, n (%)	6 (40.0%)	1 (6.3%)	0.025
Catheter migration, n (%)	8 (53.3%)	7 (43.8%)	0.594
Catheter dysfunction, n (%)	4 (26.7%)	5 (31.3%)	0.779
Peritonitis rate (episodes/patient-year)	0.89	0.66	0.510
CAUSES OF TRANSFER			
Definitive transfer to HD, n (%)	3 (20.0%)	8 (50.0%)	0.081
Peritonitis	2 (13.3%)	6 (37.5%)	0.083
Patient choice	0 (0%)	0 (0%)	0.226
Ultrafiltration failure	1 (6.7%)	1 (6.3%)	1.000
Umbilical hernia	0 (0%)	1 (6.3%)	1.000
DEATH			
Total deaths, n (%)	11 (73.3%)	2 (12.5%)	0.007

Abbreviations: KT, catheter; PD, peritoneal dialysis; HD, hemodialysis; UF, ultrafiltration.

analysis was performed (Table 5). Univariate logistic regression identified several factors associated with mortality among patients undergoing PD after transfer from chronic HD. Vascular access exhaustion was significantly associated with an increased risk of death (p = 0.006), as was assisted PD (p = 0.020). Diabetes was also associated with higher mortality, with borderline statistical significance (p = 0.050). In addition, longer prior HD duration (p = 0.030) and older age at PD initiation (p = 0.020) were significantly associated with increased mortality risk. These findings were considered exploratory associations because the analysis was univariate and the cohort size was limited.

Table 5. Univariate logistic regression analysis of factors associated with mortality.

Variable	OR	95% CI	p-value
Vascular access exhaustion	10.83	[1.96 - 59.8]	0.006
Assisted PD	8.75	[1.397 - 54.8]	0.020
Diabetes	10.0	[0.9 - 100]	0.050
Previous HD duration (per month)	1.02	[1.00 - 1.04]	0.030
Age at PD initiation (per year)	1.05	[1.01 - 1.09]	0.020

Abbreviations: OR, odds ratio; 95% CI, 95% confidence interval; HD, hemodialysis; PD, peritoneal dialysis.

Kaplan-Meier analysis showed a progressive decline in survival probability over time in both groups. However, patients who initiated PD by choice exhibited better overall survival compared with those with vascular access exhaustion. Comparison of survival curves using the log-rank test demonstrated a statistically significant difference between the two groups (p = 0.016) (Figure 4).

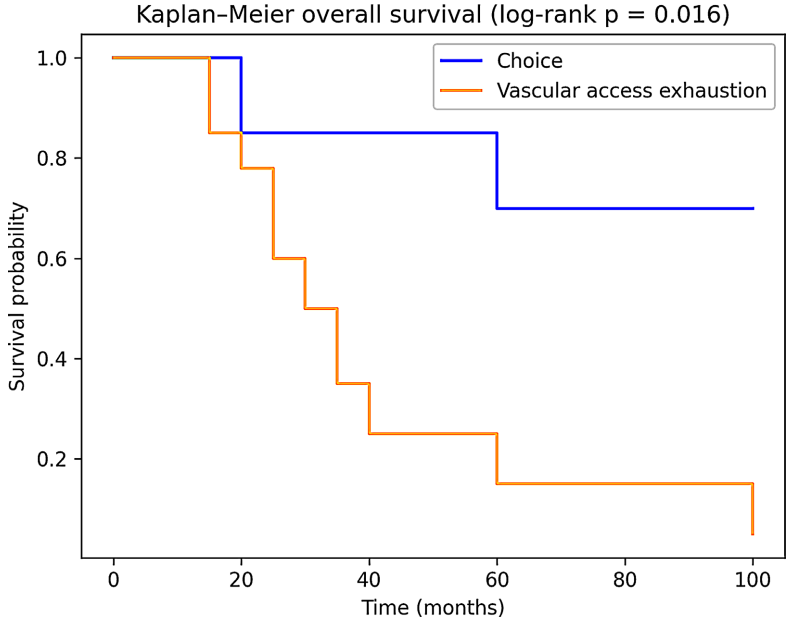

Figure 4. Overall survival according to PD indication.

Median PD technique survival was 32 months (range, 6 - 108), indicating substantial variability in technique durability. Kaplan-Meier analysis, considering transfer to HD as the event, showed a progressive decline in technique survival over time in both groups. However, no significant difference was observed between groups (log-rank p = 0.867) (**Figure 5**), suggesting that the initial indication for PD did not significantly impact technique survival. Overall patient survival according to PD indication was also assessed using Kaplan-Meier analysis.

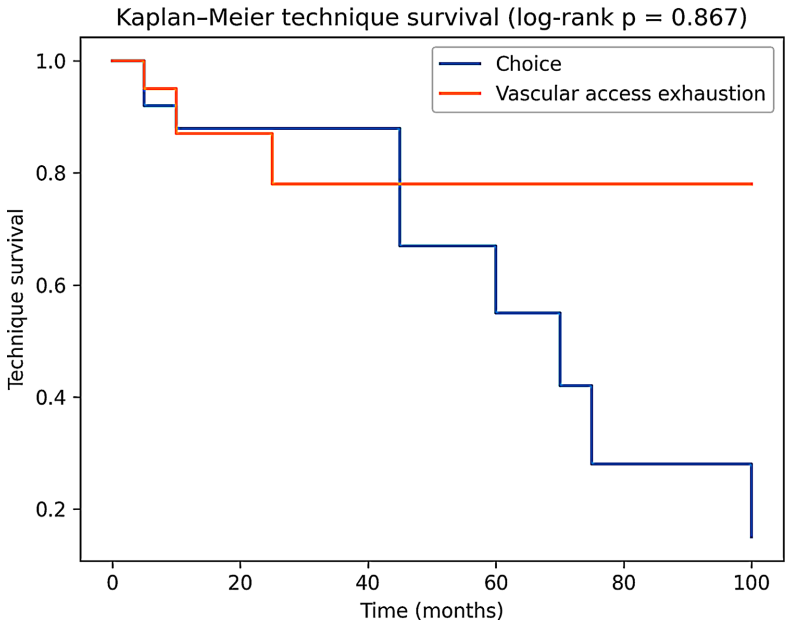

Figure 5. Technique survival according to the indication for peritoneal dialysis.

4. Discussion

The transition from HD to PD remains relatively uncommon, as consistently reported in contemporary analyses of renal replacement therapy modality transitions [3]. This low proportion likely reflects organizational and cultural factors historically favoring HD rather than any intrinsic limitation of PD [10]. A meta-analysis by Wang et al. reported substantial variability in the proportion of patients transferred from HD to PD, ranging from 7.02% in large cohorts to 41.17% in smaller series [11]. In our study, the prevalence of transfer to PD was 14%, comparable to findings from Dakar (12.03%) [12]. These similarities may be explained by the monocentric design and relatively small sample sizes. The geographic origin of patients also represents a notable feature of our cohort. Although a substantial proportion of patients came from the Rabat area, several were referred from more distant regions, particularly northern Morocco or areas located more than 200 km from our center. As illustrated by the geographic distribution map, this pattern suggests an unequal distribution of specialized peritoneal dialysis services across the country. For some patients, referral to our center therefore appeared to be driven more by healthcare access constraints than by clinical indication alone. These findings support the need to strengthen the territorial cover-

age of PD services in Morocco.

A notable feature of our cohort was the high proportion of patients with unknown primary kidney disease. This likely reflects late referral and advanced-stage presentation, frequently associated with emergency HD initiation and incomplete etiological work-up [13]. In contrast, Western registries such as the USRDS and RDPLF report well-defined etiologies, predominantly diabetic nephropathy, vascular nephropathies, and glomerular diseases [14] [15]. Patients transferred from HD to PD in our cohort exhibited clinical characteristics consistent with those reported in international series, including prolonged HD exposure, a high burden of cardiovascular comorbidities, and frequent vascular access complications [14]-[16].

Socio-educational level is an important determinant of PD suitability. In our cohort, 41.9% of patients had a higher education level, which may facilitate technique acquisition and adherence to aseptic procedures. Previous studies have demonstrated that socio-educational status influences both learning and home management of PD [17]. Notably, 71% of patients in our cohort were autonomous, indicating good technique appropriation despite home-based care constraints [18]. Importantly, international guidelines emphasize that structured education programs and assisted PD can mitigate socio-educational limitations and expand access to PD [17]. Similar high levels of autonomy have been reported in the RDPLF registry, reflecting well-organized home dialysis programs [19].

Approximately half of the transfers in our study occurred in the context of vascular access exhaustion, corresponding to what is described as rescue PD [20]. Vascular access failure is a major long-term complication of HD, and PD represents a crucial alternative for maintaining renal replacement therapy in this setting. Data from the RDPLF and other international series confirm that vascular access complications are among the leading indications for secondary transfer to PD [19]. However, several studies have shown that patients transferred late to PD tend to have poorer outcomes compared with those initiating PD as first-line therapy. This difference appears to be driven more by baseline clinical status than by the dialysis modality itself [19].

In our cohort, PD was frequently initiated in an urgent context. Urgent-start PD, defined as initiation within days of catheter placement without the conventional break-in period, has been developed to avoid urgent HD via central venous catheters, which carry high infectious and thrombotic risks [6]. Recent meta-analyses suggest that urgent-start PD is generally safe when performed under appropriate protocols, with comparable peritonitis and mortality rates to planned PD initiation [21]. However, a modest increase in early mechanical complications, particularly dialysate leaks, has been reported, consistent with our findings. In our study, peritonitis rates were within the range reported in some observational series, although they remained above the target recommended by current ISPD guidelines (<0.4 episodes per patient-year).

Peritonitis remains a major complication of PD. The absence of significant dif-

ferences between groups suggests that infection risk is more closely related to program quality than to the initial indication for PD. Survival analysis in our study showed an early divergence between groups, indicating that outcomes are strongly associated with patients' clinical status at the time of transition. Similar findings have been reported in international studies. Data from the USRDS indicate higher mortality among patients transferred from HD to PD compared with those initiating PD directly, while technique survival remains comparable [14] [22]. These findings suggest that the excess mortality observed is primarily related to patient-related factors at the time of transfer, including prolonged HD exposure, chronic inflammation, and progressive decline in RRF. However, because the present study was retrospective and the mortality analysis was not adjusted, these observations should be interpreted as exploratory associations rather than causal relationships.

Study Limitations

This study has several limitations. First, its retrospective single-center design and relatively small sample size may limit the generalizability of the findings. Second, because only patients who completed at least six months of follow-up on PD were included, early deaths, early permanent transfer back to HD, or early loss to follow-up may have been excluded. This may have introduced a survival bias and should be considered when interpreting survival outcomes. Third, the mortality analysis was exploratory and based on univariate models only, without multivariable adjustment. Therefore, the factors associated with mortality should be interpreted as associations rather than causal determinants.

5. Conclusion

Transition from HD to PD represents a relevant therapeutic option as part of an individualized renal replacement therapy pathway. In this cohort, patients transferred because of vascular access exhaustion had a poorer baseline clinical and biological profile and higher mortality than those transferred by choice. These findings suggest that vascular access exhaustion may be a marker of increased vulnerability rather than an isolated determinant of outcome. Early planning, timely discussion of PD, and shared decision-making may help optimize modality transitions. Larger prospective studies are needed to confirm these exploratory findings.

Ethics Statement

This retrospective study was conducted in accordance with the ethical principles applicable to research involving human data. Data were collected from the RDPLF registry and patients' medical records after anonymization. Patient confidentiality was strictly preserved throughout the study, and access to the database was restricted to the study investigators. Given the retrospective design and the use of anonymized routinely collected data, the requirement for informed consent was waived.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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