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From vascular access exhaustion to peritoneal dialysis: a life-saving change in strategy

(De l'impasse vasculaire à la dialyse péritonéale : un changement de stratégie salvateur)

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Summary

Introduction: Vascular access exhaustion is a critical situation in chronic hemodialysis patients and may compromise the continuation of renal replacement therapy. In this context, salvage peritoneal dialysis represents a valuable alternative. **Methods:** This retrospective monocentric descriptive and analytical study was conducted at Ibn Sina University Hospital in Rabat between 2006 and 2025. Among 257 patients treated with peritoneal dialysis, 21 had vascular access exhaustion; 15 patients were finally analyzed after exclusion of incomplete files. **Results:** Mean age was 47.1 ± 15.4 years, and median duration on hemodialysis before transfer was 49 months [36–168]. Urgent or early peritoneal dialysis initiation occurred in 60% of cases. Automated peritoneal dialysis was used in 66.7% of patients. Significant improvement was observed in hemoglobin, phosphatemia and bicarbonates, with overall preserved dialysis adequacy. Mechanical complications were frequent, especially catheter migration (53.3%) and pericatheter leaks (40%). Nevertheless, technique retention reached 80%, with a median technique survival of 24 months [16.5–34]. Overall mortality remained high (73.3%), mainly related to cardiovascular and infectious comorbidities. **Conclusion:** Salvage peritoneal dialysis is an effective and realistic strategy in patients with vascular access exhaustion, but earlier identification of at-risk patients could improve outcomes.

Keywords: Peritoneal dialysis ; chronic hemodialysis ; vascular access exhaustion ; vascular access ; technique survival ; complications

Résumé

Introduction : L'épuisement du capital vasculaire constitue une situation critique chez les patients en hémodialyse chronique, compromettant la poursuite de la suppléance rénale par voie extracorporelle. Dans ce contexte, la dialyse péritonéale de sauvetage représente une alternative thérapeutique permettant d'assurer la continuité du traitement. **Matériel et méthodes :** Il s'agit d'une étude monocentrique, rétrospective, descriptive et analytique, menée au CHU Ibn Sina de Rabat sur la période 2006–2025. Parmi 257 patients pris en charge en dialyse péritonéale, 21 présentaient une impasse vasculaire ; après exclusion de 6 dossiers inexploitable, 15 patients ont été analysés. **Résultats :** L'âge moyen était de $47,1 \pm 15,4$ ans, avec une durée médiane préalable en hémodialyse de 49 mois [36–168]. L'initiation de la dialyse péritonéale était urgente ou précoce dans 60 % des cas. La dialyse péritonéale automatisée représentait 66,7 % des modalités. Une amélioration significative de l'hémoglobine, de la phosphorémie et des bicarbonates a été observée, avec une adéquation dialytique globalement maintenue. Les complications mécaniques étaient fréquentes, notamment la migration du cathéter (53,3 %) et les fuites péricathétériques (40 %). Malgré cela, le maintien en technique atteignait 80 %, avec une survie médiane de la technique de 24 mois [16,5–34]. La mortalité globale restait élevée (73,3 %), principalement en lien avec les comorbidités cardiovasculaires et infectieuses. **Conclusion :** La dialyse péritonéale de sauvetage apparaît comme une stratégie efficace et réaliste chez les patients en impasse vasculaire, mais son recours gagnerait à être anticipé afin d'en améliorer les résultats.

Mots-clés : Dialyse péritonéale ; hémodialyse chronique ; impasse vasculaire ; accès vasculaire ; survie technique ; complications



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Introduction

The management of patients on chronic hemodialysis (CHD) relies heavily on the availability and quality of vascular access, a major determinant of the quality, efficacy, and continuity of treatment. Complications related to vascular access are a significant cause of morbidity [1,2]. Despite advances in vascular surgery and interventional radiology, a growing number of patients are reaching a state of vascular depletion, characterized by the inability to create new arteriovenous fistulas (AVFs) or to obtain functional central venous access because of extensive stenosis or thrombosis [3,4].

This trend is closely linked to the high prevalence of comorbidities, particularly thromboembolic diseases, diabetes, and hypertension, which contribute to the progressive deterioration of the vascular system [5–7]. In this context, peritoneal dialysis (PD) has emerged as a relevant therapeutic alternative. Initially considered a planned treatment modality, it is increasingly used in rescue situations, often initiated on an emergency basis, to ensure the continuity of renal replacement therapy in patients lacking functional vascular access [8,9].

In Morocco, this transition presents both a clinical and an organizational challenge. The goal is to transform this last-resort strategy into a sustainable treatment modality capable of providing a satisfactory quality of life and technical survival comparable to that of elective PD, despite a context marked by significant comorbidities and advanced vascular complications [10,11]. This study aimed to evaluate the clinical and biological outcomes of patients undergoing rescue PD in a setting of vascular access depletion and to identify the main prognostic factors.

Materials and methods

Study design and population

This single-center, retrospective, descriptive, and analytical study was conducted within the PD unit of the Nephrology–Dialysis–Renal Transplantation Department at Ibn Sina University Hospital in Rabat over a 20-year period, from January 2006 to December 2025.

Inclusion and exclusion criteria

The study included patients with chronic kidney disease (CKD) who were initially treated with hemodialysis (HD) for at least three months and then transferred to peritoneal dialysis (PD) because of documented vascular access failure according to KDOQI criteria [12]. This was defined by the presence of at least one of the following: insufficient blood flow (generally < 300 mL/min), abnormalities in extracorporeal circuit pressures (highly negative arterial pressure or high venous pressure), difficulty or inability to puncture or use the vascular access, ineffective dialysis ($Kt/V < 1.2$), or the occurrence of local complications such as thrombosis, significant stenosis, or infection of the vascular access. A minimum follow-up of one year after initiation of peritoneal dialysis was required. Patients whose records were unusable or contained major missing data were excluded.

Variables studied

Demographic, clinical, laboratory, and follow-up data were extracted from the French-Language Peritoneal Dialysis Registry (RDPLF) and the department's medical records. The demographic variables collected included age, sex, educational level, cardiovascular history, presence of diabetes, hypertension, body mass index (BMI), and the Charlson comorbidity score. Data related to hemodialysis (HD) included the total duration of treatment before transfer and the last vascular access used.

Transition to peritoneal dialysis

The timing of the initiation of exchanges was classified according to the recommendations of the International Society for Peritoneal Dialysis (ISPD) [13]: urgent peritoneal dialysis if exchanges began within 72 hours of PD catheter placement, early initiation between 3 and 14 days, and scheduled initiation beyond 14 days. The type of PD used—continuous ambulatory or automated—as well as the patient's level of independence, were also recorded.

Biological data

Biochemical profiles were assessed at the start of PD, then at 6 months and 12 months. The tests analyzed included calcium and phosphorus parameters (serum calcium, serum phosphorus, parathyroid hormone, alkaline phosphatase), nutritional and inflammatory parameters (total protein, serum albumin, hemoglobin, ferritin, nCRP, C-reactive protein), as well as dialytic adequacy parameters (residual renal function, weekly renal and peritoneal Kt/V, bicarbonate).

Statistical analysis

Statistical analyses were performed using JAMOVI software version 2.3.21.0. Categorical variables were reported as frequencies and percentages, and continuous variables as mean \pm standard deviation or median with interquartile range, depending on their distribution. Given the small sample size, nonparametric tests were preferred. Changes in biological parameters between T0, M6, and M12 were compared using the Friedman test. A p-value < 0.05 was considered statistically significant. Technical survival and overall survival were analyzed using the Kaplan–Meier method.

Results

Between January 2006 and December 2025, 257 patients were treated with PD at our center. Of these, 21 patients had vascular dead-end, representing a prevalence of 8.2%. After excluding 6 cases with incomplete data, 15 patients were included in the analysis.

The mean age of patients with vascular depletion was 47.1 ± 15.4 years, with a male-to-female ratio of 1.14. The socioeconomic and educational backgrounds of the patients were heterogeneous. Clinically, the population was characterized by a high burden of comorbidities: hypertension affected (60% of patients), heart disease (53.3%), and diabetes (33.3%). The median modified Charlson score was 2 [2–3], and the BMI was 23.8 ± 4.48 kg/m². The etiologies of CKD were dominated by diabetic nephropathy, followed by tubulointerstitial nephropathies, nephrosclerosis,

glomerular nephropathies, and unspecified forms. The transition to PD occurred after a median duration of 49 months on HD [36–168]. All patients were on long-term tunneled jugular central venous catheter (CVC) dialysis, reflecting the absence of a functional AVF alternative.

Peritoneal catheter placement was performed primarily via minilaparotomy, followed by laparoscopy; the percutaneous approach was used in only one case. According to ISPD criteria, 60% of patients received urgent or early initiation, including 20% with urgent-start and 40% with early-start. Automated peritoneal dialysis (APD) was the predominant modality, and 46.7% of patients required assisted PD (Table 1).

↓ Table 1. Demographic and clinical characteristics of patients with vascular end-stage disease (n = 15)

Parameter	Result (n = 15)
Mean age (years)	47.1 ± 15.4
Sex ratio (M/F)	1.14
Comorbidities	
Hypertension	9 (60%)
Heart disease	8 (53.3%)
Diabetes	5 (33.3%)
Charlson score (median)	2 [2–3]
BMI (kg/m ²)	23.8 ± 4.48
Initial nephropathy	
Diabetic	5 (33.3%)
Tubulointerstitial	2 (13.3%)
Nephroangiosclerosis	2 (13.3%)
Glomerular	1 (6.7%)
Undetermined	5 (33.3%)
Median duration of hemodialysis (months)	49 [36–168]
CVC at the start of PD	15 (100%)
Placement technique	Mini-laparotomy (80.6%) Laparoscopy (16.1%) Percutaneous (3.3%)
Type of PD initiation	Emergency (20%) Early (40%) Elective (40%)
PD modality	Automated peritoneal dialysis (66.7%)
Self-administered	Self-administered (53.3%) Assisted (46.7%)
Median survival of the technique (months)	24 [16.5–34]

Abbreviations: PD, peritoneal dialysis; HTN, hypertension; BMI, body mass index.

Analysis of biological data between the start of treatment, 6 months, and 12 months showed a slight improvement in Kt/V, from 1.45 to 1.48, indicating that satisfactory dialysis adequacy was maintained despite zero residual renal function throughout the follow-up period, with median values of 0 [0–0] mL/min at T0, M6, and M12, with no statistically significant variation (p = 0.06). A significant improvement in anemia was observed, with an increase in hemoglobin from 9.46 g/dL to 11.2 g/dL at one year, owing to the administration of erythropoietin and iron injections tailored to each patient's profile. Phosphate and bicarbonate levels also improved significantly, with the use of phosphate binders adjusted based on laboratory results and individual therapeutic response. In contrast, nutritional parameters showed no clear improvement, with serum albumin and total protein levels remaining generally stable, while nPCR decreased. Markers of bone

remodeling remained abnormal, with an increase in parathyroid hormone from 502 to 620 pg/mL and alkaline phosphatase from 178 to 200 IU/L (*Table II*).

↓ *Table II. Changes in biological, nutritional, and adequacy parameters at T0, M6, and M12*

Variable	T0 n = 15	M6 n = 15	M12 n = 15	P
Albumin (g/L)	34.1 ± 5.89	32.5 ± 5.74	34.0 ± 6.91	0.012
Hemoglobin (g/dL)	9.46 ± 1.80	10.7 ± 1.66	11.2 ± 1.58	< 0.001
Total protein (g/L)	65.9 ± 8.69	63.1 ± 9.41	65.2 ± 11.6	0.003
Calcium (mg/L)	84.4 ± 10.6	84.5 ± 11.0	84.6 ± 12.4	0.025
Phosphorus (mg/L)	63.7 ± 16.4	55.4 ± 20.7	53.2 ± 22.3	0.005
PAL (IU/L)	178 [119–196]	193 [148–314]	200 [102–521]	0.012
PTH (pg/mL)	502 ± 412	637 ± 542	620 ± 595	0.021
Kt/V	1.45 ± 0.438	1.49 ± 0.412	1.48 ± 0.382	< 0.001
FRR (mL/min)	0 [0 - 0]	0 [0 - 0]	0 [0 - 0]	0.060
nPCR (g/kg/day)	0.754 ± 0.302	0.685 ± 0.139	0.682 ± 0.141	0.008
Ferritin (ng/mL)	725 ± 601	473 ± 391	766 ± 607	0.102
CRP (mg/L)	7.5 [4.5–12.8]	7.0 [3.5–10.0]	8.0 [6.25–28.5]	0.704
Bicarbonates (mmol/L)	17.8 ± 4.39	25.8 ± 2.49	25.1 ± 3.23	0.005

Abbreviations: CRP, C-reactive protein; eGFR, estimated glomerular filtration rate; nPCR, normalized protein catabolism rate; ALP, alkaline phosphatase; PTH, parathyroid hormone.

The clinical course revealed a high incidence of early mechanical complications, primarily catheter migration (53.3%) and pericatheter leaks (40.0%). Despite these initial technical events, peritoneal dialysis ensured the continuity of renal replacement therapy, with a technique retention rate of 80%. Three patients required permanent transfer to HD, primarily because of peritonitis in two cases and loss of ultrafiltration in one case (*Table III*). They underwent venous angioplasty with placement of a long-term tunneled jugular venous catheter to resume and maintain continuity of hemodialysis.

↓ *Table III. Complications and outcomes of patients with vascular access depletion*

Parameter	n = 15	Outcome
Pericatheter leaks	6	40.0%
Catheter migration	8	53.3%
PD catheter dysfunction	4	26.7%
Peritonitis rate	–	0.89 episodes/patient-year
Permanent transfer to hemodialysis	3	20.0%
Peritonitis	2	13.3%
Ultrafiltration loss	1	6.7%
All-cause mortality	11	73.3%

After a median survival of 24 months following peritoneal dialysis [16.5–34], the mortality rate observed during follow-up was high, reaching 73.3%. This mortality rate appears to reflect the severity of cardiovascular and infectious conditions rather than failure of the technique itself. Of the 11 recorded deaths, cardiovascular causes accounted for 5 cases, while extraperitoneal infectious

complications accounted for 5 cases—primarily related to septic shock and pneumonia—and a single death was directly attributable to peritonitis. At the end of follow-up, four patients were still alive and continuing PD. No patient underwent a kidney transplant (KT) during the study period.

A comparison of Kaplan–Meier curves showed an earlier decline in overall survival among patients with vascular depletion compared with the rest of the cohort, which maintained higher and more stable survival rates throughout follow-up (*Figure 1*). A similar trend was observed for technical survival (*Figure 2*). However, the small sample size of the group with vascular impasse limits the robustness of this comparison.

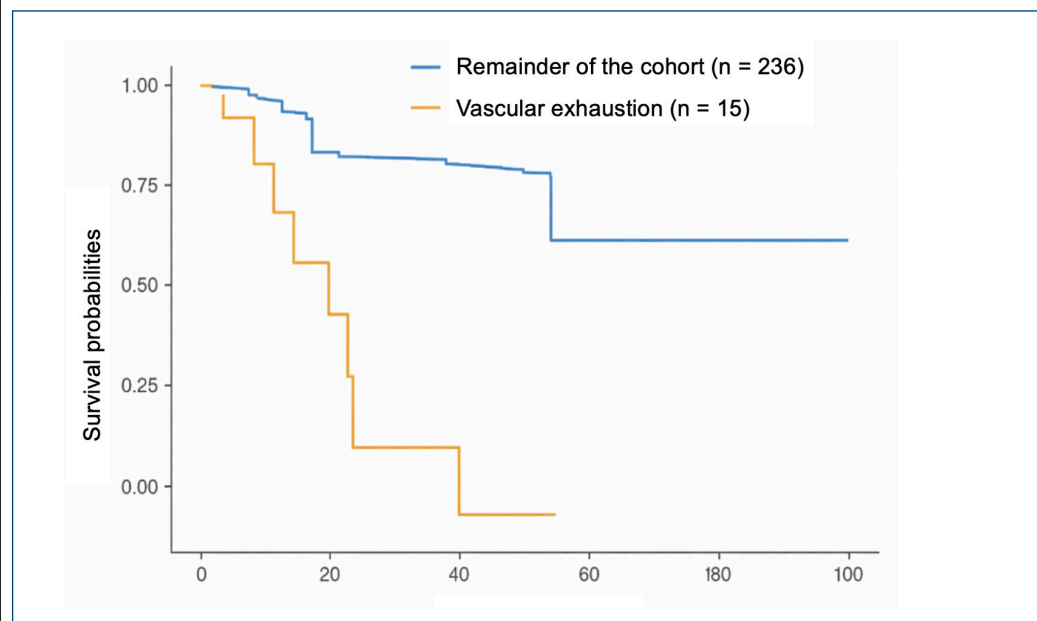


Figure 1. Kaplan–Meier overall survival curve comparing patients with vascular depletion to the rest of the cohort

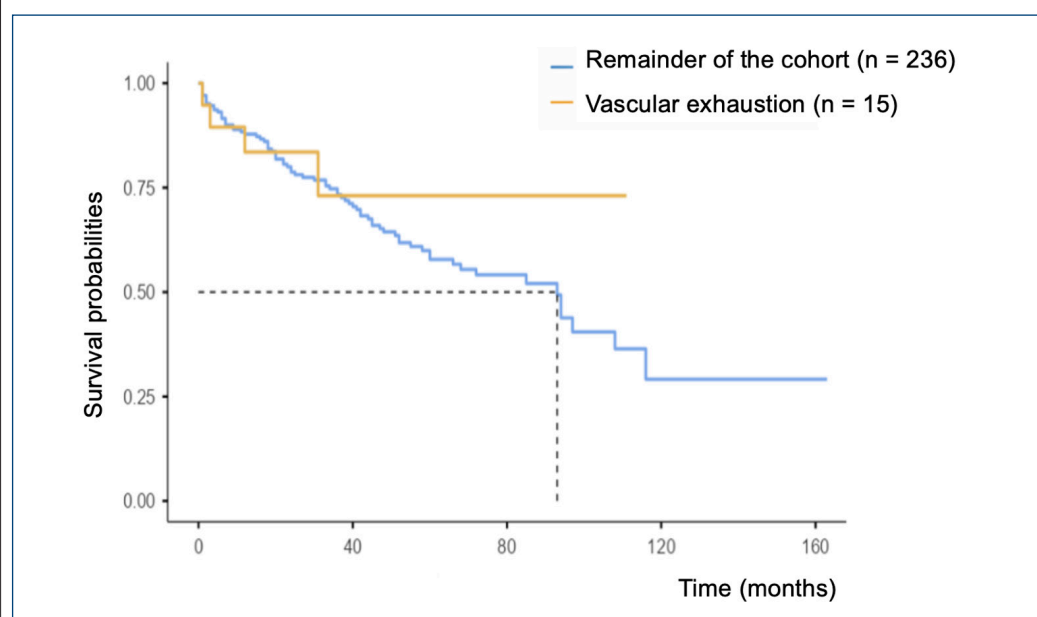


Figure 2. Kaplan–Meier technique survival curve comparing patients with vascular depletion to the rest of the cohort

Discussion

In Morocco, the management of chronic kidney disease (CKD) remains largely dominated by hemodialysis (HD), with peritoneal dialysis (PD) accounting for only a minority of renal replacement therapies [14,15]. Our findings reflect this reality, in which the diagnosis of kidney disease is often delayed. In this context, vascular depletion rarely appears as a direct consequence of the initial etiology, but rather as the culmination of a prolonged course of HD. Initiating PD in cases of vascular failure is therefore a last-resort measure to ensure continuity of renal replacement therapy in patients who no longer have viable vascular access.

In our series, transfer to peritoneal dialysis (PD) occurs after a prolonged median duration of hemodialysis (HD). This delay suggests that the impasse is the result of a progressive process of thrombosis and stenosis exacerbated by repeated vascular access procedures. The patient profile reflects a high burden of disease, with a high prevalence of hypertension and heart disease. However, the Charlson score remained moderate, with a median of 2 [2–3], in a population with a mean age of 47.1 years, indicating a relatively limited overall burden of comorbidities. This situation suggests frailty that is primarily vascular and systemic in nature, without necessarily being associated with the conditions most heavily weighted by this index [16–18].

Unlike some findings in the international literature, where obesity is described as a major risk factor for vascular access failure, our series is distinguished by the absence of obese patients [19–23]. This finding underscores that, in our context, vascular exhaustion appears to be more closely linked to vascular access management and the chronicity of dialysis than to metabolic barriers associated with excess weight. This critical situation has a major impact on quality of life [24,25]. For patients with vascular access exhaustion, each HD session can be experienced as traumatic because of difficulty with puncture. After switching to PD, improvement in quality of life was reported, linked to the disappearance of needle anxiety and better hemodynamic stability. From an organizational standpoint, the transition is often carried out under time pressure, which explains the widespread use of assisted mechanical ventilation and the high incidence of early mechanical complications. Despite these events, the rate of continued mechanical ventilation observed in our series remains satisfactory, confirming that rescue mechanical ventilation is a robust option. Biological outcomes confirm this efficacy, with generally satisfactory Kt/V values during follow-up and improvements in hemoglobin, serum phosphorus, and bicarbonate levels, while nutritional parameters remained more stable.

The lack of vascular access also raises the issue of renal replacement therapy (RRT). In our cohort, no patient underwent transplantation. This finding reflects the reality in Morocco, where transplantation remains rare, and living donor (LD) donation is still insufficient to meet demand [26–28]. For these patients, whose vascular bed is severely compromised, the scarcity of transplants makes PD a potentially long-term survival solution, the main long-term limitation of which remains encapsulating peritoneal sclerosis [29–31].

Finally, although the overall mortality rate is high, it appears to be more closely linked to the severity of the patients' multivascular condition than to failure of the technique itself. The observed rate of peritonitis, which exceeds international recommendations, reflects the complexity of this often-dependent patient population [32]. In Morocco, PD is most often used as a second-line treatment after HD, largely because of insufficient patient information and limited therapeutic

education regarding the various renal replacement modalities. In our series, PD was initiated in a context of urgent initiation of extrarenal clearance, reflecting delays in planning the replacement strategy and delayed access to renal replacement therapy.

In this context, it is also important to note that the quality of the initial presentation of dialysis techniques and their regular reassessment in consultation with the patient still has room for improvement. Several recent studies emphasize the importance of structured and early therapeutic education in the choice of renal replacement therapy, showing that clear and repeated information significantly increases the use of PD and promotes planned rather than emergency initiation. Conversely, the lack of foresight and regular reassessment of the care pathway are associated with a predominance of HD initiated in emergency settings, often via catheter, and with an increased risk of vascular depletion.

In this context, international guidelines—particularly those of the KDOQI—emphasize, through the concept of the Life Plan, the need to implement an individualized and adaptive renal replacement therapy strategy at an early stage, taking into account changes in the vascular network and the patient's preferences. Taking better account of the risks of vascular depletion, starting from the initial information phase and continuing during therapeutic adjustments, would therefore optimize selection of the most appropriate technique, promote early use of PD, and limit situations of late emergency transition [12].

Study limitations

This study has several limitations because of its single-center and retrospective nature, which limits the generalizability of the results. The small cohort size also limits the statistical power and the scope of survival comparisons.

Conclusion

PD is a vital and technically reliable treatment option for patients with vascular end-stage disease. Despite a high cardiovascular and infectious burden associated with high overall mortality, the technical survival rate for this modality remains satisfactory. Vascular exhaustion should no longer be viewed as a terminal failure, but rather as a predictable stage in the renal replacement therapy journey. Earlier identification of patients at risk of vascular exhaustion would allow better preparation for transition, potentially optimizing clinical outcomes and quality of life.

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Authors' Contributions

All authors contributed to the study design, data collection or analysis, drafting or critical revision of the manuscript, and approved the final version.

NS: writing; NH: analysis; NE: data collection; NO: supervision; LB: validation.

Ethical Considerations and patient's consent

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki.

Informed consent was not required for this study as the patient data were fully anonymized and analyzed

retrospectively from institutional medical records, strictly guaranteeing patient confidentiality.

Artificial Intelligence

The authors declare that this manuscript is the product of personal and original work. Artificial intelligence tools or applications were not utilized for data analysis, generation of results, or text creation and drafting.

Conflicts of Interest

The authors declare that they have no conflicts of interest

Data Availability Statement

The datasets generated and analyzed during the current study are not publicly available due to institutional regulations and legal restrictions protecting patient privacy and data confidentiality.

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References

1. Woo K, Fuld R, Grandinetti A, et al. Patient-reported outcomes in hemodialysis vascular access: A call to action. *J Vasc Access*. 2022;23:973-980. doi: <https://doi.org/10.1177/11297298211018295>
2. Rozenberg I, Benchetrit S, Raigorodetsky M, Fajer S, Shnaker A, Nacasch N, Einbinder Y, Zitman-Gal T, Cohen-Hagai K. Clinical Outcomes of Vascular Accesses in Hemodialysis Patients. *Isr Med Assoc J*. 2022;24(8):514-519. PMID:35972011.
3. Pride LB, Assaf EJ, West-Livingston LN, et al. Alternatives for exhausted dialysis access. *Semin Vasc Surg*. 2024;37:400-406. doi: <https://doi.org/10.1053/j.semvascsurg.2024.10.003>
4. Lok CE, Huber TS, Orchanian-Cheff A, et al. Arteriovenous Access for Hemodialysis: A Review. *JAMA*. 2024;331:1307-1317. doi: <https://doi.org/10.1001/jama.2024.0535>
5. Brahmabhatt A, Misra S. The Biology of Hemodialysis Vascular Access Failure. *Semin Interv Radiol*. 2016;33:15-20. doi: <https://doi.org/10.1055/s-0036-1572355>
6. Winkelmayr WC, Burke SK, Chertow GM, et al. Vascular Access Thrombosis Events in Patients With Dialysis-Dependent CKD Treated With Vadadustat or Darbepoetin Alfa: The INNO2VATE Trial Program. *Kidney Med*. 2025;7:100997. doi: <https://doi.org/10.1016/j.xkme.2025.100997>
7. Lopez AG, Sanchez R, Vesga J, et al. Factors Associated with Hemodialysis Vascular Access Failure: A retrospective study in Colombia. *Rev Colomb Nefrol*. 2023;10. <https://doi.org/10.22265/acnef.10.1.629>
8. Vogt B, Shah AD. Urgent-Start Peritoneal Dialysis: Current State and Future Directions. *Kidney Dial*. 2024;4:15-26. doi: <https://doi.org/10.3390/kidneydial4010002>
9. Issad B. Place de la dialyse péritonéale dans le monde et en France : aspects épidémiologiques et principales indications. *Bull Acad Natl Med*. 2022;206:200-214. doi: <https://doi.org/10.1016/j.banm.2021.12.003>
10. Sanchez JE, Ulloa C, Bueno CM, et al. Impact of peritoneal dialysis strategy on technique and patient survival. *Clin Kidney J*. 2023;16:2523-2529. doi: <https://doi.org/10.1093/ckj/sfad155>
11. Oliver MJ, Abra G, Béchade C, et al. Assisted peritoneal dialysis: Position paper for the ISPD. *Perit Dial Int*. 2024;44:160-170. doi: <https://doi.org/10.1177/08968608241246447>

12. Lok CE, Huber TS, Lee T, et al. KDOQI Clinical Practice Guideline for Vascular Access: 2019 Update. *Am J Kidney Dis.* 2020;75:S1-S164. doi: <https://doi.org/10.1053/j.ajkd.2021.02.002>
13. Peritoneal Dialysis Access Guideline Update 2023 - A SAGES Publication. SAGES. Accessed April 18, 2026. <https://www.sages.org/publications/guidelines/peritoneal-dialysis-access-guideline-update-2023/>
14. Fedouache M, Challal I, Chourite C, et al. Epidemiological profile of end-stage chronic kidney disease in the Rabat-Salé-Kenitra Region (Morocco): An analysis of patient characteristics and care organization. *BIO Web Conf.* 2025;200:01026. doi: <https://doi.org/10.1051/bioconf/202520001026>
15. Hmaidouch N, El Kadiri N, Benhadda S, et al. Peritoneal Dialysis in Morocco: Nineteen Years of Experience from the First National Center and Evaluation of Technique Survival and Mortality. *Epidemiol Health Syst J.* 2025;12:114-119. doi: <https://doi.org/10.34172/ehsj.26438>
16. Quan H, Li B, Couris CM, et al. Updating and validating the Charlson comorbidity index and score for risk adjustment in hospital discharge abstracts using data from 6 countries. *Am J Epidemiol.* 2011;173:676-682. doi: <https://doi.org/10.1093/aje/kwq433>
17. Johansen KL, Gilbertson DT, Li S, et al. US Renal Data System 2024 Annual Data Report: Epidemiology of Kidney Disease in the United States. *Am J Kidney Dis.* 2025;85:A8-A11. doi: <https://doi.org/10.1053/j.ajkd.2025.02.602>
18. Gomez AT, Kiberd BA, Royston JP, et al. Comorbidity burden at dialysis initiation and mortality: A cohort study. *Can J Kidney Health Dis.* 2015;2:34. doi: <https://doi.org/10.1186/s40697-015-0068-3>
19. Lee SHT, Ng JJ, Choong AMTL. The Effect of Obesity on Outcomes After Arteriovenous Fistulae Creation: A Systematic Review. *Ann Vasc Surg.* 2023;92:304-312. doi: <https://doi.org/10.1016/j.avsg.2023.02.005>
20. Elsayed NA, Emad Eldin M. Tailoring Hemodialysis Access for Obese Patients: A Review of Current Evidence and Clinical Implications. *Egypt J Surg.* 2026. doi: <https://doi.org/10.21608/ejsur.2025.394530.1516>
21. Fisher AT, Mulaney-Topkar B, Sheehan BM, et al. Predictors of maturation failure in arteriovenous dialysis access. *J Vasc Surg.* 2026;83:273-279. doi: <https://doi.org/10.1016/j.jvs.2025.08.046>
22. Lok CE, Yuo T, Lee T. Hemodialysis Vascular Access: Core Curriculum 2025. *Am J Kidney Dis.* 2025;85:236-252. doi: <https://doi.org/10.1053/j.ajkd.2024.05.021>
23. Nordanstig J, Behrendt C-A, Baumgartner I, et al. European Society for Vascular Surgery (ESVS) 2024 Clinical Practice Guidelines on the Management of Asymptomatic Lower Limb Peripheral Arterial Disease and Intermittent Claudication. *Eur J Vasc Endovasc Surg.* 2024;67:9-96. doi: <https://doi.org/10.1016/j.ejvs.2023.08.067>
24. Aljawadi MH, Babaer AA, Alghamdi AS, et al. Quality of life tools among patients on dialysis: A systematic review. *Saudi Pharm J.* 2024;32:101958. doi: <https://doi.org/10.1016/j.jpsp.2024.101958>
25. Elsherbiny M, Almuhanha S, Alathel R, et al. Quality of Life and Complications Among Hemodialysis Patients. *Cureus.* 2024;16. doi: <https://doi.org/10.7759/cureus.71086>
26. Asserraji M, Maoujoud O, Belarbi M, et al. Profil épidémiologique de l'insuffisance rénale terminale à l'hôpital Militaire de Rabat, Maroc. *Pan Afr Med J.* 2015;20:439. doi: <https://doi.org/10.11604/pamj.2015.20.439.3352>
27. Noto-Kadou-Kaza B, Sabi KA, Imangue G, et al. Transplantation rénale au Maroc: l'hémodialysé et son entourage sont-ils suffisamment informés? *Pan Afr Med J.* 2014;19:365. doi: <https://doi.org/10.11604/pamj.2021.39.85.26685>
28. Jandou I, Ouzir M, Ettanji A, et al. Profil épidémiologique et analyse des facteurs prédictifs du refus du don d'organe chez la population marocaine. *Prog Urol.* 2022;32:381-387. doi: <https://doi.org/10.1016/j.purol.2021.06.001>
29. Elphick EH, Manera KE, Viecei AK, et al. Establishing a peritoneal dialysis technique survival core outcome measure: A standardised outcomes in nephrology-peritoneal dialysis consensus workshop report. *Perit Dial Int.* 2025;45:153-161. doi: <https://doi.org/10.1177/08968608241287684>
30. Nabil H, Nada EK, Naima O, et al. Long-Term Outcomes and Survival of Peritoneal Dia-

lysis Beyond 10 Years: A Single-Center Study. Acta Medica. 2025;68:101-106. doi: <https://doi.org/10.14712/18059694.2025.28>

31. Hmaidouch N, Kadiri NE, Ouzeddoun N, et al. Clinical outcomes and complication rates of peritoneal dialysis in elderly patients: an 18-year retrospective analysis. Geriatr Care. 2026. doi: <https://doi.org/10.4081/gc.2026.13963>

32. Li PK-T, Chow KM, Cho Y, et al. ISPD peritonitis guideline recommendations: 2022 update on prevention and treatment. Perit Dial Int. 2022;42:110-153. doi: <https://doi.org/10.3747/pdi.2018.00030>

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