Transition from Conventional Hemodialysis to Incremental Hemodialysis in a Patient with Stage V Chronic Kidney Disease – A Case Report

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Abstract

D.S., a a 77-year-old woman with end-stage diabetic nephropathy, initiated conventional hemodialysis (HD) on October 29, 2024, initially using a non-tunneled central venous catheter (CVC) as vascular access for the first two months, followed by the use of a native arteriovenous fistula (AVF). She managed to preserve a significant residual urine volume (>0.3–0.5 L/day), which prompted consideration of transitioning to incremental hemodialysis. From November 2024 until April 10, 2025, she underwent conventional hemodialysis three times per week (weekly treatment time [WTT] ~660–720 minutes), achieving high dialysis adequacy (spKt/V 1.40–1.78, URR ~75–83% per session). Hemoglobin remained stable (~10.0–11.2 g/dL) with transferrin saturation (TSAT) levels of 24–26% and ferritin levels of 450–520 µg/L, using modest doses of Epoetin (~4500-6000 IU/week). Interdialytic weight gains were minimal (-0.3-1.6% of dry weight), and mean arterial pressure (MAP) fluctuated around ~85–90 mmHg under antihypertensive therapy. Starting from April 10, 2025, the patient transitioned to incremental hemodialysis twice per week (total WTT ≈480 minuts) to take advantage of the persistence of residual renal function. After the change, dialysis parameters remained within target ranges: calculated spKt/V and URR values stayed above adequacy thresholds, volume status and blood pressure remained controlled, and hematological parameters for anemia evaluation remained stable without the need for further increases in erythropoietin (EPO) dosing. This clinical case illustrates that selected elderly patients with residual kidney function (RKF) can safely initiate dialysis using an incremental regimen without compromising adequacy or metabolic balance. In this case report, we discuss the rationale and safety of incremental hemodialysis in elderly diabetic patients, while also considering the latest protocols and studies supporting individualized and stepwise regimens to preserve residual function and quality of life (QOL).

Key-words: conventional hemodialysis, incremental hemodialysis, chronic kidney disease, case report, transition, quality of life.

Introduction

Traditionally, hemodialysis is performed three times per week for patients with end-stage kidney disease (ESKD), regardless of their residual renal clearance. However, many patients at the time of initiation still retain a certain level of residual renal function (RKF). Preserving RKF significantly contributes to the elimination of solutes and fluids and is associated with better outcomes. [1] Incremental hemodialysis (iHD) represents a personalized strategy that allows patients to start dialysis with less intensive regimens (e.g., twice a week or shorter sessions) and gradually escalate dialysis doses as RKF progressively declines. [1] Unlike rigid "one-size-fits-all" protocols, iHD tailors dialysis based on residual clearance and comorbidities. [1] By reducing treatment burden (fewer hours per week) and potentially minimizing dialysis-induced hypotension, iHD may preserve RKF and improve patient well-being. A helpful conceptual illustration (shown below) of this approach shows that the dialysis "dose" (frequency or duration) is gradually escalated over time as native GFR values decline, rather than transitioning immediately to a full-dose regimen. [1][2]

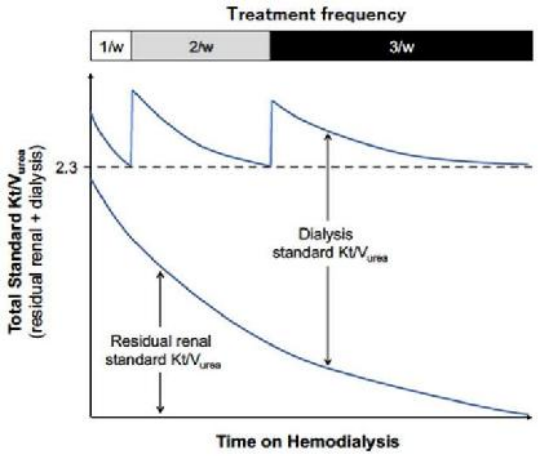

Image 1: The concept of incremental hemodialysis. "The dose" of treatment gradually rises with time (arrow) while RFK values fall.

Recent nephrology guidelines recognize the potential of iHD for selected patients. For example, the 2020 KDOQI guidelines allow for reduced dialysis doses when there is significant RKF and define that the target adequacy (spKt/V ≥ 1.2 per session, three times a week) can be achieved through a combination of dialysis and RKF clearance. [3] KDIGO and leading European clinics similarly recommend monitoring RKF and individualizing HD accordingly. [4][5] Furthermore, observational studies have shown that iHD can preserve RKF and prolong the patency of vascular access without evident disadvantages in survival among selected patients. [5][6] These benefits are more evident in elderly patients or those with low metabolic rates, who generate fewer uremic toxins and often have minimal interdialytic weight gains. [2][5] Nevertheless, concerns remain about the risk of under-dialysis (especially regarding fluid and electrolyte control) during longer interdialytic intervals. Therefore, advocates of this approach emphasize careful patient selection and close monitoring. We present a case that illustrates a safe transition to incremental hemodialysis in an elderly diabetic female patient with residual diuresis, while also highlighting dialysis adequacy and clinical parameter stability following a reduction of HD frequency to twice weekly.

Discussion

This clinical case illustrates how the careful selection of elderly patients with significant residual renal function may benefit from a reduced HD frequency while preserving adequacy and clinical stability. We highlight four key domains:

Dialysis Adequacy

Before the regimen change, the patient's per-session spKt/V (1.40–1.83) and URR (~75–84%) were both above minimum target values (spKt/V ≥1.2, URR ≥65%). [3] After switching to the incremental regimen, adequacy remained satisfactory: each session continued to provide spKt/V ≈1.80 (URR ~82%), and combined with the patient's RKF, her total weekly clearance (stdKt/V) remained above 2.3. This aligns with protocols supporting lower dialysis frequency when RKF is present. [3] In our practice, we closely monitored urea kinetics and ensured target values were achieved; there were no signs of chronic underdialysis (e.g., rising urea levels or symptoms).
Recent literature supports that twice-weekly regimens with Kt/V ≥1.2 per session and modest RKF can achieve optimal solute clearance equivalence. [3][6] The 2020 KDOQI guidelines explicitly state that dialysis dose "may be reduced" if RKF is significant. [3] Similarly, European protocols encourage individualized dosing, accounting for both dialysis clearance and RKF. [4]

Table 1: Dialysis Adequacy Parameters (January–April 2025)

Month	Kt/V	URR (%)
January	1.58	76
February	2.01	83
March	1.95	82
April	2.06	83

Volume Control and Hemodynamics

The patient's small interdialytic weight gains (≤2% of dry weight) and well-controlled blood pressure are indicators of a euvolemic status. Residual diuresis (~0.4 L/day) contributes to continued fluid elimination and consequently reduces the need for ultrafiltration. Observationally, patients on incremental hemodialysis (HD) often have better volume control and fewer hypotensive episodes. [1]
In theory, fewer sessions increase the interdialytic interval, thereby raising the risk of fluid overload. However, in our case, the patient's weight gains remained modest (<5%) and could be easily eliminated in two sessions per week. This reflects the advantage of preserving residual kidney function (RKF): even a low glomerular filtration rate (GFR) can support intermittent fluid loads and stabilize volume. [1] Moreover, incremental regimens can employ slightly longer sessions or more personalized dry weight targets to compensate for the interdialytic interval.
In our patient, ultrafiltration rates remained ≤8 mL/kg/hour, and she did not experience intradialytic hypotension. The literature highlights that less intensive UF rates in incremental HD may help reduce cardiac stress and prolong RKF longevity. [1][4] In elderly patients, who often have a less pronounced sense of thirst and lower muscle mass, fluid accumulation tends to be limited, making incremental regimens more feasible. [5]

Table 2: Clinical parameters and Dialysis Metrics

Month	MAP (mmHg)	Weight gain (%)	WTT (min/week)	Qb (mL/min)
November	95	0.7	720	292
December	97	-0.3	660	318
January	93	-0.5	716	297
February	92	-0.1	713	303
March	92	1.0	720	334
April	90	1.6	720	363

Anemia management

Adequate clearance of middle-sized molecules and preservation of residual renal erythropoietic factors may improve anemia control in patients with CKD. [5] In our patient, hemoglobin levels were maintained at 10–11 g/dL with moderate doses of EPO. TSAT and ferritin levels were kept within acceptable ranges (TSAT ~25–30%, ferritin ~450–520 ng/mL) through intravenous iron supplementation, according to KDIGO guidelines. [7] At the same time, the reduction in HD frequency did not worsen anemia or increase the need for higher EPO doses. On the contrary, Hb remained stable and EPO doses were unchanged. This is consistent with other reports suggesting that preservation of residual kidney function (RKF) and less frequent HD may reduce ESA requirements, likely related to endogenous clearance of uremic inhibitors of erythropoiesis. [1][5]

Table 3: Hemoglobin, Iron Studies and EPO use

Month	Hemoglobin (g/dL)	TSAT (%)	Ferritin (µg/L)	EPO (IU/week)
November	7.9			
December	9.0	22	292	4500
January	10.3	22*	292*	6000
February	10.7	22*	292*	6000
March	11.2	25	470	1000
April	10.6	25*	470*	-

The values marked with * represent measurements not taken in the corresponding month, but rather according to the quarterly laboratory analysis protocols.

Metabolic Balance

Regular monitoring showed a stable hydro-electrolytic and acid-base status. Key metabolic parameters (potassium, phosphate, bicarbonate) did not increase after the transition; meanwhile, some patients on incremental HD can compensate with modest dietary restrictions. There were no instances of hyperkalemia or acidosis. This supports evidence that even residual patient clearance may buffer intermittent therapy. [1] We reinforced patient education regarding dietary restrictions (e.g., limiting salt and potassium), and all markers (phosphate, calcium) remained within normal limits.

Table 4: Phosphate-Calcium Balance

Month	PTH(pg/mL)	Phosphate (mg/dL)	Calcium (mg/dL)
November	-	3.63	9.33
December	-	3.18	8.7
January	-	2.93	8.17
February	268	3.62	8.77
March	268*	3.93	8.78
April	268*	3.99	9.16

Safety and Rationale in Elderly Patients

At 71 years old, our patient D.S. falls into the elderly dialysis population, where personalized goals may differ from younger cohorts. [5] Older adults typically have lower metabolic demands and often shorter life expectancy, shifting the risk-benefit balance. In the systematic review *"Dialysis for Older Adults,"* authors highlight that standard Kt/V target values may sometimes be too aggressive for elderly patients, and

incremental HD "should be considered the primary choice for most patients starting dialysis with residual kidney function." [5] Observational studies in elderly diabetic cohorts have not found survival disadvantages with incremental regimens when patients are carefully selected. [6][8] For example, Kalantar-Zadeh et al. showed in a large U.S. cohort that patients on incremental HD with adequate baseline RKF preserved renal clearance better and had no higher mortality than those on conventional regimens. [6]

Similarly, Piccoli et al. reported that introducing incremental HD in a dialysis center population did not increase the risk of death, and diabetes status did not alter this outcome. [8] These findings align with our experience: despite being diagnosed with diabetic nephropathy and other comorbidities, D.S. tolerated iHD well.

Current protocols suggest several criteria for safe incremental HD: substantial RKF (urine output >500 mL/day or GFR >2–3 mL/min), good vascular access, manageable interdialytic gains, and patient compliance. [1][5] Our patient met these criteria: she had a daily urine output of 350–500 mL, a suitable fistula, and no contraindications (e.g., severe heart failure or malnutrition). Her AVF matured in January 2025, providing high Qb levels (~360 mL/min), which helped achieve higher per-session Kt/V values than before. This enabled a safe de-escalation for the patient.

When comparing literature, elderly patients on iHD often experience better outcomes when their RKF is utilized. According to Piccoli et al. 2022, among patients starting iHD, being diabetic and/or elderly did not predict differences in mortality. [8] Other authors have noted that frail elderly patients may benefit from fewer treatments – they experience less post-dialysis fatigue and maintain RKF longer. [5] Conversely, some studies emphasize that iHD can be risky if RKF is overestimated or lost quickly. Notably, Kalantar-Zadeh observed higher mortality in incremental regimens among patients with minimal baseline K/ru (≤3 mL/min). [6] This underscores the importance of regular RKF assessment. In D.S., we continue to measure her urinary volumes monthly; her clearance remains at ~3–4 mL/min. If/when her RKF is significantly reduced (e.g., <2 mL/min), returning to a conventional regimen will be indicated, following KDOQI protocols. [3]

In summary, the patient's post-transition data does not show loss of adequacy or safety: Kt/V remained above 1.2 and URR >65%, volume control and blood pressure remained stable, target anemia levels were achieved without additional therapy, and the patient reported a good sense of well-being. This real-life result aligns with the notion that incremental HD, when applied appropriately, can maintain clinical stability.

Conclusion

In this 71-year-old patient with diabetic nephropathy, incremental hemodialysis (reduction from three to two sessions per week) was successfully implemented without compromising adequacy or clinical stability. Residual kidney function allowed safe reduction in dialysis dose: adequacy targets were maintained, volume and blood pressure were controlled, and both anemia and metabolic parameters remained stable. Our patient's case supports recent studies suggesting that some elderly patients with preserved urine output may be transitioned to less intensive dialysis regimens. [1][5] The decision for incremental dialysis – preserving residual renal function and patient quality of life – was successfully achieved in practice. Rigorous monitoring remains essential, and dialysis frequency must be escalated if residual function declines or lab parameters worsen. This case provides evidence that the traditional "one size fits all" approach of three sessions per week can be safely modified for elderly patients with some residual clearance, as long as protocols are followed and monitoring is continuous and rigorous.

Patient Consent

Patient D.S. provided written consent for her demographic, clinical, and laboratory data to be used for research purposes. She was informed that at every stage of the study, her anonymity would be ensured and any identifying details would be removed. The patient was made aware that the collected data was exclusively for research use and that there was no professional or monetary interest involved.

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