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Case report

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Three-time renal recovery after dialysis-dependent acute kidney injury in a 75-year-old woman with hypertensive nephropathy: A case report with five-year follow-up

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Abstract. *Dialysis-dependent acute kidney injury (AKI-D) in elderly patients with chronic comorbidities is typically associated with poor renal prognosis. Reports of repeated recovery after multiple AKI-D episodes are rare.*

In this case, we describe a 75-year-old woman with hypertensive nephropathy who experienced three distinct episodes of AKI-D over five years. The first episode occurred in 2021 in the setting of a hypertensive crisis with oliguria and severe azotemia, requiring eight sessions of hemodialysis. The second episode followed COVID-19 vaccination and excessive use of nonsteroidal anti-inflammatory drugs (NSAIDs), leading to 14 sessions of hemodiafiltration. The third episode developed in 2025 after a COVID-19 infection and concomitant antibiotic and NSAID therapy, again requiring temporary kidney replacement therapy. Remarkably, in each instance, the patient regained sufficient kidney function to discontinue hemodialysis, with recovery documented at serum creatinine levels of 97 $\mu\text{mol/L}$, 115.8 $\mu\text{mol/L}$, and a current value of 147.3 $\mu\text{mol/L}$, corresponding to an estimated glomerular filtration rate of 32 mL/min/1.73 m². At discharge after the first episode of AKI, the condition was assessed as CKD stage 5 (eGFR 13 mL/min/1.73m²), and an arteriovenous fistula was created, but kidney function fully normalized within the next two weeks. Vascular access was complicated by aneurysmal dilation of an arteriovenous fistula, necessitating surgical closure.

This case highlights the potential for renal recovery even in elderly patients with comorbidities and raises important considerations regarding prognostic evaluation, nephrotoxic medications, and vascular access management.

Keywords: *acute kidney injury, renal recovery, hemodialysis, hypertensive nephropathy, elderly, case report.*

Conflict of interest. The authors declare no conflict of interest.

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Триразове відновлення функції нирок після діаліз-залежного гострого пошкодження нирок у 75-річної пацієнтки з гіпертензивною нефропатією: клінічний випадок з п'ятирічним спостереженням

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Резюме. Діаліз-залежне гостре пошкодження нирок (ГПН) у літніх пацієнтів з хронічними коморбідними станами зазвичай асоціюється з несприятливим прогнозом. Повторне відновлення функції нирок після кількох епізодів діаліз-залежного ГПН описується надзвичайно рідко.

Представлено клінічний випадок 75-річної жінки з гіпертензивною нефропатією, у якої протягом п'яти років відбулося три окремі епізоди діаліз-залежного ГПН. Перший епізод у 2021 році розвинувся на тлі гіпертензивного кризу з олігурією та тяжкою азотемією, що потребувало проведення восьми сесій гемодіалізу. Другий епізод виник після вакцинації проти COVID-19 та надмірного застосування нестероїдних протизапальних засобів (НПЗЗ), у зв'язку з чим проведено 14 сесій гемодіалізації. Третій епізод, який розвинувся у 2025 році після інфікування COVID-19, прийому НПЗЗ та супутньої антибіотикотерапії, знов потребував тимчасової ниркової замісної терапії. Примітно, що в усіх трьох епізодах відзначалось відновлення функції нирок до рівня, достатнього для припинення лікування гемодіалізом: показники сироваткового креатиніну становили 97 мкмоль/л, 115,8 мкмоль/л та 147,3 мкмоль/л (швидкість клубочкової фільтрації 32 мл/хв/1,73 м²), відповідно до кожного епізоду. На момент виписки після першого епізоду ГПН, стан був розцінений як ХХН V (ШКФ 13 мл/хв/1,73 м²) та сформовано артеріовенозну фістулу, але протягом двох тижнів функція нирок повністю нормалізувалась. Судинний доступ ускладнився формуванням аневризматичного розширення, що потребувало хірургічного закриття.

Наведений випадок демонструє потенціал відновлення функції нирок навіть у літніх пацієнтів з коморбідними станами та порушує важливі питання щодо прогностичної оцінки, застосування нефротоксичних лікарських засобів і обережного планування формування судинного доступу.

Ключові слова: гостре пошкодження нирок, відновлення функції нирок, гемодіаліз, гіпертензивна нефропатія, літні пацієнти, клінічний випадок.

Introduction. Severe acute kidney injury (AKI) requiring kidney replacement therapy (KRT) is associated with high short-term mortality and an increased risk of transition to end-stage kidney disease (ESKD), especially among elderly patients with cardiovascular and metabolic comorbidities [1, 2]. Recovery of kidney function sufficient to discontinue dialysis after dialysis-dependent AKI (AKI-D) is possible but occurs in a minority of cases, with reported rates varying between 20% and 40% depending on age, baseline renal status, etiology of injury, and duration of RRT [1, 3].

In elderly patients, renal recovery is particularly uncommon due to reduced nephron reserve, higher burden of comorbidities, and increased susceptibility to nephrotoxic insults [4, 5]. Moreover, once dialysis is initiated in this population, clinicians often assume an irreversible trajectory toward ESRD, and vascular access planning is usually directed toward long-term

hemodialysis [6]. However, such assumptions may underestimate the potential for renal resilience in selected individuals.

Another important aspect is the cumulative impact of recurrent kidney injury. Repeated AKI episodes are associated with accelerated progression of chronic kidney disease (CKD) and increased mortality [7, 8]. The probability of renal recovery declines with each subsequent episode, and recurrent AKI has been identified as an independent risk factor for ESKD [7, 9]. Against this backdrop, the case we present is noteworthy: a 75-year-old woman with hypertensive nephropathy who experienced three discrete episodes of AKI-D within five years, yet regained sufficient kidney function to discontinue dialysis after each episode.

Case presentation. The patient was followed between 2020 and 2025. She had a history of traumatic brain injury in 2016, arterial hypertension, first diagnosed in September 2020, hypertensive heart disease, and a transient ischemic attack in 2020. She reported no history of diabetes, chronic kidney disease, or prior kidney dysfunction before 2021. She was not under regular nephrology follow-up until the first AKI episode. Her long-term medications included occasional antihypertensives (berlipril intermittently) but no nephrotoxic drug use until 2021.

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In 2020, urinalysis and serum creatinine were in the reference ranges, with no proteinuria or azotemia documented. Blood pressure was elevated (≥ 160 mmHg) and treated inconsistently.

In May 2021, the patient presented with a hypertensive crisis (blood pressure 170–180/90 mmHg) and neurological complaints, including imbalance and dizziness. Laboratory tests revealed a rapid deterioration of kidney function with serum creatinine rising to 743 $\mu\text{mol/L}$, blood urea nitrogen 31 mmol/L, and oliguria (urine output 0.4 L/day). She developed symptoms of uremic intoxication, including nausea, vomiting, and anorexia. She was admitted to a nephrology depart-

ment, and urgent hemodialysis was initiated. A total of eight sessions were performed between June 5 and June 18, 2021. Her clinical condition improved, diuresis increased to over 2 L/day, and serum creatinine decreased to 321 $\mu\text{mol/L}$. She was discharged on June 23, 2021, with recommendations for nephrology follow-up. At the time of discharge, she was labeled as having CKD stage 5 (estimated glomerular filtration rate, eGFR 13 mL/min/1.73m²), and future preparedness, an arteriovenous fistula (AVF) was surgically created in the left cubital fossa. However, within the next two weeks, her kidney function surprisingly normalized, with creatinine 97 $\mu\text{mol/L}$ documented in July 2021 (Table 1).

Table 1

Longitudinal changes in hematological and biochemical parameters during recurrent AKI episodes

Date	Hb (g/L)	ESR (mm/h)	Creatinine ($\mu\text{mol/L}$)	Urea (mmol/L)	Uric Acid ($\mu\text{mol/L}$)	K (mmol/L)	eGFR (mL/min/1.73m ²)
30.05.2021	121	14	456.8	18.0	—	8.0	8
05.06.2021	117	36	743.1	31.0	686.1	7.1	5
23.06.2021	100	12	321.4	19.6	487.2	3.7	13
06.07.2021	114	10	97.2	6.1	339.6	4.2	54
16.11.2021	—	—	665.0	46.9	—	4.1	5
21.11.2021	97	36	894.2	30.2	—	4.2	4
14.12.2021	95	32	278.7	18.2	436.5	4.0	15
21.12.2021	97	30	198.3	12.8	—	4.2	23
04.01.2022	98	16	115.8	8.9	387.0	4.6	44
10.04.2024	121	8	116.7	8.5	345.0	4.5	43
07.02.2025	119	11	118.9	8.2	—	4.2	41
13.04.2025	120	18	1210.3	47.8	—	5.3	3
21.04.2025	—	—	269.1	11.1	—	4.5	15
03.06.2025	121	10	145.4	9.3	408.0	5.0	32
06.08.2025	119	15	147.3	9.5	380.0	4.6	32

The second episode occurred in November 2021, shortly after receiving a COVID-19 vaccination (CoronaVac 0.5 mL). To control post-vaccination fever, she ingested excessive doses of nonsteroidal anti-inflammatory drugs (NSAIDs). Within days, she developed weakness, nausea, and vomiting. Laboratory analysis showed creatinine rising to 665–894 $\mu\text{mol/L}$ and urea 47 mmol/L, though urine output remained >1 L/day. On November 18, 2021, kidney replacement therapy (KRT) was restarted, this time with hemodiafiltration (HDF). She underwent 14 procedures until December 22, 2021. During this period, she received antihypertensive therapy, anemia management, and correction of calcium-phosphate disturbances. Kidney function improved, with creatinine decreasing to 198 $\mu\text{mol/L}$ by late December and further to 115.8 $\mu\text{mol/L}$ by January 2022. She discontinued dialysis and was classified as CKD stage 3b.

Between 2022 and early 2025, the patient remained clinically stable. Blood pressure was well controlled at

120–130/80 mmHg, and creatinine remained around 115–118 $\mu\text{mol/L}$ (eGFR 41–44 mL/min/1.73m²), consistent with CKD stage 3b. In April 2024, she reported no symptoms and was managed on oral antihypertensives. However, vascular access complications emerged: in February 2025, duplex ultrasound of the AVF demonstrated aneurysmal dilation of the outflow vein up to 22 mm in diameter with very high blood flow (3139 mL/min). Because her kidney function was stable and dialysis-independent, the fistula was surgically ligated on March 11, 2025.

The third episode of AKI occurred in April 2025, when the patient contracted COVID-19 with fever and acute bronchitis. She received antibiotic therapy (specific agents not documented) and repeatedly self-administered NSAIDs for fever and headache. One week later, she experienced worsening weakness, nausea, and urine output declining to 0.6 L/day. Upon admission, serum creatinine had risen sharply to 1210 $\mu\text{mol/L}$, with urea 47.8 mmol/L and serum potassium 5.3 mmol/L.

A double-lumen dialysis catheter was placed in the left subclavian vein, and KRT was resumed with eight HDF sessions between April 15 and May 1, 2025. Her clinical status improved steadily, and diuresis normalized. The central venous catheter was removed on May 2, 2025. By June 2025, creatinine stabilized at 145 $\mu\text{mol/L}$ with an eGFR of 32 mL/min/1.73m², corresponding to CKD stage IIIb.

Thus, over a five-year follow-up, the patient experienced three severe AKI episodes, each necessitating temporary hemodialysis, yet recovered kidney function sufficiently to discontinue KRT every time.

Discussion. This case illustrates several unusual and clinically important aspects of AKI in an elderly patient. The most striking feature is the repeated recovery of kidney function following three separate episodes of AKI-D within a five-year period. Such recoveries are rare in elderly populations, particularly when AKI is superimposed on chronic comorbidities such as hypertensive nephropathy and cardiovascular disease.

Recovery from AKI-D is variable and depends on age, baseline kidney function, etiology of injury, comorbid conditions, and the duration of KRT. Cohort studies suggest that only 20–40% of patients with AKI-D regain sufficient kidney function to discontinue dialysis [10]. In elderly patients, recovery is even less frequent due to diminished nephron reserve, vascular disease, and heightened vulnerability to nephrotoxins [1, 5, 9]. Our patient not only recovered after a single episode of AKI-D but also achieved functional recovery after three distinct episodes, each time reaching serum creatinine levels consistent with moderate CKD. Following her most recent AKI-D, a creatinine concentration of 147 $\mu\text{mol/L}$ corresponded to CKD stage 3b, reflecting an age-related decline in eGFR (32 mL/min/1.73 m²). This outcome contrasts with the expected course in comparable patients, where even one AKI-D episode often results in progression to ESKD.

Recurrent AKI is increasingly recognized as a major contributor to CKD progression and mortality. In the large population-based study by Holmes et al., 29.3% of patients with AKI experienced a second episode, 9.9% a third, and 4.0% four or more episodes [7]. Importantly, outcomes worsened with each recurrence: 30-day mortality was significantly higher in patients with multiple episodes compared to those with a single event (31.3% vs. 24.9%, $P < 0.001$). Similarly, recovery to baseline kidney function after 30 days was more likely following a single episode (83.6%) than after recurrent episodes (77.8%, $P < 0.001$). The likelihood of another AKI also increased progressively with each successive episode, rising from 31.0% after the first episode to over 50% after the third and fourth episodes.

It should be noted that most recurrent episodes tend to occur within the first six months after the index event, reflecting persistent vulnerability during this period [11]. In our patient, the second AKI-D developed approximately six months after the first, consistent with this expected high-risk window. However, the third ep-

isode occurred only after a prolonged three-year interval of stability with near-normal kidney function. This atypical course suggests that her later episode was not simply the result of ongoing intrinsic decline, but rather the consequence of a distinct acute trigger.

Each episode in this patient had a clear precipitant: hypertensive crisis, excessive NSAID use after COVID-19 vaccination, and COVID-19 infection with concomitant antibiotics and NSAIDs. Both NSAID use and COVID-19 infection reflect common and potentially preventable causes of AKI [12, 13]. NSAIDs, in particular, are strongly nephrotoxic in the elderly, especially when combined with infection or volume depletion [14]. COVID-19 itself has been shown to precipitate AKI in older adults through direct viral injury, systemic inflammation, and hemodynamic instability, frequently worsening outcomes, with reported mortality rates approaching 50% [15, 16].

The case also highlights challenges in vascular access management. Following the first AKI-D episode, an AVF was created in anticipation of future dialysis dependence. However, the patient repeatedly regained kidney function, and the AVF later developed aneurysmal dilation, requiring surgical closure. This raises the question of timing and the necessity of permanent vascular access creation in patients with uncertain renal trajectories. Early AVF creation is standard for progressive CKD approaching ESKD, but in patients who may recover after AKI-D, the risks of long-term AVF complications must be weighed carefully against potential benefits [6].

Several lessons emerge from this case. First, renal resilience should not be underestimated. Although CKD stage 3 is typically associated with factors that reduce the likelihood of recovery, including oxidative stress, reduced nephron reserve, chronic inflammation, and heightened sensitivity to nephrotoxic agents [17–19], our patient repeatedly regained kidney function to a level sufficient for dialysis independence. This unexpected course illustrates the variability of outcomes in elderly CKD patients and suggests that meaningful recovery is still possible even in the presence of multiple adverse conditions. Second, while recurrent AKI generally carries a poor prognosis, individual trajectories may differ, as shown here. Third, strict avoidance of nephrotoxic exposures, particularly NSAIDs, remains essential for protecting kidney function in vulnerable patients. Finally, vascular access planning should be individualized, taking into account not only the risk of progression to ESKD but also the potential for renal recovery.

As a single case report, these observations cannot be generalized to the broader CKD population. Although the clinical course was thoroughly documented, the mechanisms underlying the patient's repeated renal recovery remain uncertain. Nevertheless, the extended follow-up and documentation of three separate recovery episodes contribute to a better understanding of the heterogeneity of renal outcomes after AKI-D.

Conclusions. This case illustrates that meaningful renal recovery is possible even in elderly patients after multiple episodes of AKI-D. Despite the presence of CKD stage 3b and several adverse prognostic factors, kidney function repeatedly returned to a level sufficient for dialysis independence. The patient's course emphasizes the variability of outcomes in recurrent AKI, the importance of avoiding nephrotoxic exposures, and the need for cautious, individualized decisions regarding vascular access. Clinicians should remain alert to the potential for renal resilience and avoid prematurely assuming irreversible dialysis dependence.

Ethics approval. Not applicable.

Consent for publication. Written informed consent for publication of this case report was obtained from the patient.

Availability of data and materials. All relevant clinical data are included within the article. Additional details are available from the corresponding author on reasonable request.

Competing interests. The authors declare that they have no competing interests.

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Authors' contributions.

Tetyana Ostapenko: conceptualization of the case report, clinical supervision of patient management, critical revision of the manuscript;

Valeria Marchenko: data collection, analysis of laboratory and imaging results, preparation of the table, manuscript drafting;

Alina Holovanova: literature review, interpretation of findings, manuscript drafting.

Mark Dyvynskyy: case documentation, manuscript drafting. All authors read and approved the final manuscript.

References:

1. Prasad G, Deepankar P, Choudhary MK, Ahmad A, Ram B, Kumar N, et al. Clinical Profile and Short-Term Outcomes of Acute Kidney Injury in Elderly Patients in a Tertiary Care Center. *Cureus*. 2024;16(6):e62690. doi: 10.7759/cureus.62690.
2. Paškevičius Ž, Skarupskienė I, Balčiuvienė V, Dalinkevičienė E, Kušleikaitė-Pere N, Petruilienė K, et al. Mortality Prediction in Patients with Severe Acute Kidney Injury Requiring Renal Replacement Therapy. *Medicina (Kaunas)*. 2021;57(10):1076. doi: 10.3390/medicina57101076.
3. Wing S, Neto AS, Bellomo R, Clark EG, Gallagher M, Liangos O, et al. CKD Progression after Acute Kidney Injury: A Secondary Analysis of the Standard versus Accelerated Initiation of Renal Replacement Therapy in Acute Kidney Injury Trial. *Kidney360*. 2025;6(4):636-644. doi: 10.34067/KID.0000000663.
4. Peng JC, Wu T, Wu X, Yan P, Kang YX, Liu Y, et al. Development of mortality prediction model in the elderly hospitalized AKI patients. *Sci Rep*. 2021;11(1):15157. doi: 10.1038/s41598-021-94271-9.
5. Zhao X, Li C, Lu Y, Li S, Guo F, Xue H, et al. Characteristics and risk factors for renal recovery after acute kidney injury in critically ill patients in cohorts of elderly and non-elderly: a multicenter retrospective cohort study. *Ren Fail*. 2023;45:2166531. doi: 10.1080/0886022X.2023.2166531.
6. Lomonte C, Forneris G, Gallieni M, Tazza L, Meola M, Lodi M, et al. The vascular access in the elderly: a position statement of the Vascular Access Working Group of the Italian Society of Nephrology. *J Nephrol*. 2016;29:175-84. doi: 10.1007/s40620-016-0263-z.
7. Holmes J, Geen J, Williams JD, Phillips AO. Recurrent acute kidney injury: predictors and impact in a large population-based cohort. *Nephrology Dialysis Transplantation*. 2020;35(8):1361-9. doi:10.1093/ndt/gfz155.
8. Sako K, Furuichi K, Yamamura Y, Oshima M, Toyama T, Kaneko S, et al. Association between the recurrence period of acute kidney injury and mortality: a single-centre retrospective observational study in Japan. *BMJ Open*. 2019;9:e023259. doi: 10.1136/bmjopen-2018-023259.
9. Liu KD, Yang J, Tan TC, Glidden D V., Zheng S, Pravoverov L, et al. Risk Factors for Recurrent Acute Kidney Injury in a Large Population-Based Cohort. *Am J Kidney Dis*. 2019;73 (2):163 -173. doi: 10.1053/j.ajkd.2018.08.008.
10. Shah S, Ng JH, Leonard AC, Harrison K, Meganathan K, Christianson AL, et al. A clinical score to predict recovery in end-stage kidney disease due to acute kidney injury. *Clin Kidney J*. 2024;17:85. doi: 10.1093/ckj/sfae085.
11. Rodríguez E, Arias-Cabrales C, Bermejo S, Sierra A, Burballa C, Soler MJ, et al. Impact of Recurrent Acute Kidney Injury on Patient Outcomes. *Kidney Blood Press Res*. 2018;43:34-44. doi: 10.1159/000486744.
12. Aklilu AM, Kumar S, Nugent J, Yamamoto Y, Coronel-Moreno C, Kadhim B, et al. COVID-19 – Associated Acute Kidney Injury and Longitudinal Kidney Outcomes. *JAMA Intern Med*. 2024;184:414-23. doi: 10.1001/jamainternmed.2023.8225.

13. *Klomjit N, Ungprasert P.* Acute kidney injury associated with non-steroidal anti-inflammatory drugs. *Eur J Intern Med.* 2022;101:21–8. doi: 10.1016/j.ejim.2022.05.003.
14. *Ngcobo NN.* Influence of Ageing on the Pharmacodynamics and Pharmacokinetics of Chronically Administered Medicines in Geriatric Patients: A Review. *Clinical Pharmacokinetics.* 2025;64(3):335–67. doi: 10.1007/s40262-024-01466-0.
15. *Yuasa BK, Magalhães LE, Oliveira PGS de, Yokota LG, Cardoso PA, Zamoner W, et al.* Acute Kidney Injury in Elderly Patients With Coronavirus Infectious Disease: A Study of Incidence, Risk Factors, and Prognosis in Brazil. *Frontiers in Nephrology.* 2022;2:896891. doi: 10.3389/fneph.2022.896891.
16. *Salgueira M, Almenara M, Gutierrez-Pizarraya A, Belmar L, Labrador PJ, Melero R, et al.* Characterization of hospitalized patients with acute kidney injury associated with COVID-19 in Spain: renal replacement therapy and mortality. *FRA-COVID SEN Registry Data. Nefrologia (English Edition).* 2024;44:527–39. doi: 10.1016/j.nefro.2023.03.017.
17. *Kadatane SP, Satariano M, Massey M, Mongan K, Raina R.* The Role of Inflammation in CKD. *Cells.* 2023;12(12):1581. doi: 10.3390/cells12121581.
18. *Vasylchenko VS, Korol L V., Kuchmenko OB, Stepanova NM.* The oxidative status in patients with chronic kidney disease. *Ukr Biochem J.* 2020;92:70–77. doi: 10.15407/ubj92.05.070.
19. *Gorelik Y, Khamaisi M, Abassi Z, Evans RG, Heyman SN.* Renal functional recovery among inpatients: A plausible marker of reduced renal functional reserve. *Clin Exp Pharmacol Physiol.* 2021;48(12):1724–7. doi: 10.1111/1440-1681.13545.