ISSN 2607-9917 www.bdd.rdplf.org Volume 8, n° 3, september 2025 https://doi.org/10.25796/bdd.v8i3.87084

Bulletin de la Dialyse à Domicile

Home Dialysis Bulletin (BDD)

International bilingual journal for the exchange of knowledge and experience in home dialysis

(English edition) (version française disponible à la même adresse)

Peritoneal dialysis in an infant with severe acute renal failure: dialysis performed in flight during a medical evacuation in French Guiana – A case report

(Dialyse péritonéale chez un nourrisson avec insuffisance rénale aiguë sévère : dialyse réalisée en plein vol lors d'une évacuation sanitaire en Guyane – À propos d'un cas)

Arriel Makembi Bunkete[1,3], Malika Belgrine[2,4], Mohamed Sidibe[2], Sindya Bellony[2], Timoté Davodoun[2], Irénée Djiconkpode[1], Tanguy Fortuné Gbaguidi[2]

[1]CHU de Guyane, site de Saint-Laurent-du-Maroni, Saint-Laurent-du-Maroni, Guyane française,
[2]CHU de Guyane, site de Cayenne, Cayenne, Guyane française,
[3]Université de Kinshasa, Service de néphrologie, Département de médecine interne, Cliniques universitaires de Kinshasa, Kinshasa, République démocratique du Congo,
[4]Université de Tizi-Ouzou, Faculté de médecine, Tizi-Ouzou, Algérie

To cite : Makembi Bunkete A, Belgrine M, Sidibe M, Bellony S, Davodun T, Djiconkpode I, Gbaguidi TF. Peritoneal Dialysis in an Infant with Severe Acute Kidney Injury: Dialysis Performed In-Flight During a Medical Evacuation in French Guiana – A Case Report. Bull Dial Domic [Internet];8(3). Available from: https://doi.org/10.25796/bdd.v8i3.87084

Summary

We report the case of a 7-month-old infant presenting with severe acute kidney injury in the context of respiratory infection and dehydration who was managed in French Guiana, an isolated territory with limited medical resources. Automated peritoneal dialysis was initiated early, leading to rapid clinical improvement. Due to the necessity of medical evacuation to a referral center, continuity of treatment was maintained aboard a commercial flight from Cayenne to Paris (duration 8 hours 30 minutes) through the performance of three manual exchanges of ambulatory continuous peritoneal dialysis. These exchanges were conducted by a multidisciplinary team (pediatrician, adult nephrologist, nurse) with the assistance of the infant's mother using an improvised setup that adhered strictly to aseptic protocols. This case highlights the feasibility, safety, and strategic importance of peritoneal dialysis in extreme pediatric settings and constrained environments.

Keywords: peritoneal dialysis, acute kidney injury, infant, in-flight dialysis, French Guyana, medical evacuation

Résumé

Nous rapportons le cas d'un nourrisson de 7 mois présentant une insuffisance rénale aiguë sévère dans un contexte d'infection respiratoire et de déshydratation, pris en charge en Guyane française, territoire isolé à ressources limitées. Une dialyse péritonéale automatisée a été instaurée précocement, entraînant une amélioration rapide de l'état clinique. Face à la nécessité d'une évacuation sanitaire vers un centre de référence, la continuité du traitement a été assurée à bord d'un vol commercial entre Cayenne et Paris (durée 8 heures 30 minutes), grâce à la réalisation de trois échanges manuels de dialyse péritonéale continue ambulatoire. Les échanges ont été effectués par une équipe multidisciplinaire composée d'un pédiatre, d'un néphrologue adulte et d'une infirmière, avec l'aide de la mère de l'enfant, et au moyen d'un dispositif improvisé respectant les règles d'asepsie. Ce cas illustre la faisabilité, la sécurité et l'intérêt stratégique de la dialyse péritonéale en contexte pédiatrique extrême et en environnement contraint.

Mots-clés : dialyse péritonéale, insuffisance rénale aigüe, Guyane Française, nourisson, dialyse en vol, evacuation sanitaire

journal officiel du Registre de Dialyse Péritonéale de Langue Française **RDPLF** www.rdplf.org

www.bdd.rdplf.org Volume 8, n° 3, september 2025
https://doi.org/10.25796/bdd.v8i3.87084
ISSN 2607-9917

Introduction

Acute kidney injury (AKI) is a common complication in hospitalized children, with a prevalence ranging from 5% to 25% depending on the severity of the episode and the level of care [1]. It is associated with a significant increase in morbidity and mortality across all age groups [1, 4]. In regions where renal replacement therapy is not readily available, mortality associated with AKI is significantly higher [5].

Peritoneal dialysis (PD) has long been the first-line renal replacement therapy in pediatrics. Although it has been gradually replaced in high-income countries by hemodialysis (HD) and continuous renal replacement therapy (CRRT), PD remains the most common technique in infants and in resource-limited countries [6, 7]. It has several advantages over other techniques: moderate cost, technical feasibility, the lack of need for heavy equipment, and adaptability to small volumes, including in premature infants [8, 10]. Thus, recent recommendations from the International Society for Peritoneal Dialysis (ISPD) emphasize its value as the minimum standard of care for pediatric AKI, particularly in resource-limited regions [11, 12].

In this context, French Guiana presents a profile of a location with increased vulnerability for the pediatric population. Access to pediatric nephrology is limited, geographical distances require frequent medical evacuations, and infrastructure remains fragile [13, 14]. PD is, therefore, an essential adaptative tool in this territory, ensuring accessible and safe emergency renal replacement therapy.

The ISPD's international recommendations emphasize the relevance of PD in AKI in children, particularly in resource-limited areas. They reiterate that PD, including manual PD, can be performed safely even in infants and newborns and is often the treatment of choice in the absence of extracorporeal technologies such as CRRT or HD [9, 12]. These guidelines emphasize the need to adapt standards to the realities on the ground, setting a minimum safety standard for pediatric PD while recommending that an optimal standard be sought whenever possible.

In this context, the case presented here is particularly noteworthy. It involves a 7-month-old infant with severe AKI in a context of metabolic decompensation in French Guiana who was successfully treated with automated peritoneal dialysis (APD) and then manual continuous ambulatory peritoneal dialysis (CAPD) during an intercontinental medical evacuation flight. This extremely rare experience demonstrates the feasibility, safety, and efficacy of continuous PD treatment even outside a hospital setting and in a very young child. It highlights the strategic value of PD for the pediatric population in isolated areas and argues for the strengthening of this modality in public health policies in French Guiana.

Patient and observation

Patient presentation

A 7-month-old infant weighing 8.3 kg and measuring 72 cm (estimated body surface area 0.41 m^2), with no significant medical history, was transferred from the Centre Hospitalier de l'Ouest Guyanais (CHOG) to the Centre Hospitalier Andrée Rosemon (CHAR) for acute respiratory distress, severe anemia, and marked renal impairment occurring in the context of an upper respiratory tract infection and diarrhea that had been progressing for four days.

journal officiel du Registre de Dialyse Péritonéale de Langue Française RDPLF www.rdplf.org

www.bdd.rdplf.org Volume 8, n° 3, september 2025
https://doi.org/10.25796/bdd.v8i3.87084
ISSN 2607-9917

Clinical and paraclinical assessment

On admission, the child presented with Kussmaul breathing and without signs of respiratory distress, indicating profound metabolic acidosis. The extremities were cold, and peripheral pulses were well palpable, with stable systolic blood pressure around 120 mmHg. There was rapidly progressive oligoanuria. The child was conscious and alert, with a Glasgow Coma Scale score of 15, without meningeal syndrome or focal neurological signs. He was afebrile, breathing ambient air, with oxygen saturation at 100% and a respiratory rate ranging between 30 and 40 cycles per minute. No signs of shock were observed.

The initial biological assessment, including arterial blood gas analysis, revealed severe metabolic acidosis (pH: 6.99; pCO_2: 26 mmHg; bicarbonate: 5.6 mmol/L), associated with a high anion gap (21.4 mmol/L). Acute renal failure was evident from creatinine levels of 396 μmol/L and urea levels of 30 mmol/L, accompanied by hyperkalemia of 6.7 mmol/L. Serum chloride and sodium concentrations were 108 and 135 mmol/L, respectively, with a lactate level of 3.5 mmol/L. Severe anemia (hemoglobin 6.9 g/dL) was associated with predominantly neutrophilic leukocytosis (26.8 G/L), a normal platelet count, CRP 11.7 mg/L, and moderately elevated procalcitonin (0.79 ng/mL).

Ultrasound of the urinary tract showed kidneys with regular contours, no focal or diffuse lesions, but with increased cortical echogenicity compared to the liver and spleen, as well as bilateral hypotonia consistent with parenchymal involvement. Parenchymal–sinus differentiation was preserved, and no obstructions were visible in the excretory tract. A moderate amount of intra-abdominal fluid effusion was also observed between the intestinal loops. The bladder, gallbladder, and hepatobiliary structures were unremarkable.

Chronology and treatment

• **Day 0 (D0)**: Initial management was implemented to stabilize the patient. This included a 160 mL blood transfusion administered over 4 hours to correct anemia, appropriate rehydration at a rate of 100 mL/kg/day with a 5% glucose solution enriched with 4 g/L sodium chloride, and correction of metabolic acidosis by infusion of sodium bicarbonate at a dose of 2 mL/kg (i.e., 16 mL), administered over 4 hours.
• ***Day 1 (D1)***: Given the persistence of anuria and acidosis, a collegial decision was made, after consulting the referring pediatric nephrologist, to resort to emergency peritoneal dialysis (PD). The peritoneal catheter was surgically inserted by the pediatric surgery team.
• ***Day 2 (D2)***: Automated peritoneal dialysis (APD) was started according to a protocol of five cycles of 350 mL each, with a dwell time of 30 minutes, for a total duration of three hours. The prescribed dialysate volume was adjusted according to body surface area in accordance with the recommendations [11] : i.e., 800 mL/m². This corresponded to a volume of 328 mL, rounded to 350 mL per cycle. The procedure resulted in ultrafiltration of 350 mL. It was well tolerated by the child, with no signs of respiratory deterioration or initial peritoneal leakage.
• ***Day 3 (D3)***: The dwell time was extended to 4 hours to reduce excessive ultrafiltration, and hydration was introduced through retrofiltration to prevent dehydration. Six exchanges were performed over 24 hours, with a total injected volume of 2,100 mL and a cumulative ultrafiltration of 1,300 mL. The child showed rapid clinical improvement, with blood pH rising to 7.29, eupneic breathing, and no need for oxygen.

journal officiel du Registre de Dialyse Péritonéale de Langue Française **RDPLF** www.rdplf.org

www.bdd.rdplf.org Volume 8, n° 3, september 2025
https://doi.org/10.25796/bdd.v8i3.87084
ISSN 2607-9917

• ***Day 4 (D4)***: The patient was medically evacuated intercontinentally by commercial flight from Cayenne to Paris (Robert Debré University Hospital), a flight lasting 8 hours and 30 minutes. Peritoneal dialysis was continued on board thanks to three manual exchanges performed by an adult nephrologist accompanying the transfer. The child's mother actively participated in the procedures, illustrating the importance of collaboration in a constrained environment. In the absence of a pole to suspend the dialysis bags, the flight attendants improvised a mechanism using a support to hang the bags at the joint of the overhead compartments.

The transfer was supervised by a multidisciplinary team (pediatrician, adult nephrologist, and registered nurse). Aseptic rules were strictly followed: sterile gloves and masks were worn by the entire team, and a hydroalcoholic solution was used. The volumes infused were adjusted precisely using a scale borrowed from a local dialysis patient: after each drainage, the volume recovered was weighed, and the excess transferred to the drainage bag until the prescribed volume was obtained, then administered into the peritoneal cavity. During the third exchange, a leak was detected, prompting the exchanges to be stopped for the remainder of the flight.

On arrival in Paris, the child was in good general condition, with stable breathing and no ionic or acid–base disorders.

Follow-up and results

The initial clinical course under peritoneal dialysis was marked by a gradual correction of hydroelectrolytic and acid–base disorders, as well as the resumption of diuresis. No significant recovery of renal function was observed, however, thus justifying the initiation of chronic peritoneal dialysis. Genetic testing was negative. Dialysis treatment was continued at Nice University Hospital for family reasons related to the mother.

Discussion

This case highlights several critical issues that are particularly pronounced in the pediatric population in French Guiana, a French overseas territory facing significant geographical isolation and limited specialized care.

Increased vulnerability of children to acute kidney injury (AKI)

Children hospitalized in French Guiana, particularly those in critical condition, are at increased risk of AKI, a common complication in this population, with a prevalence of up to 25% [1, 2]. In the absence of both a pediatric nephrology unit and appropriate extracorporeal techniques in the territory, treatment options are limited. This situation exposes children to delays in treatment and preventable mortality, As has already been emphasized in another publication regarding the status of pediatric nephrology in French Guiana [13].

Peritoneal dialysis: a suitable, safe, and accessible treatment option

PD, particularly manual CAPD, is proving to be a technique of choice for children, especially in low-resource settings, such as French Guiana. The 2021 ISPD recommendations confirm its central role in the management of pediatric AKI, particularly in low-birth-weight infants and

journal officiel du Registre de Dialyse Péritonéale de Langue Française RDPLF www.rdplf.org

www.bdd.rdplf.org Volume 8, n° 3, september 2025
https://doi.org/10.25796/bdd.v8i3.87084
ISSN 2607-9917

newborns after cardiac surgery [5, 6]. Although its use is declining in high-income countries, it remains the predominant method in many resource-limited countries and remains valuable for young patients, particularly in the postoperative setting or in areas without access to CRRT [7, 9].

An example of successful organization despite constraints

This case is remarkable for its unprecedented implementation of PD sessions in flight during a medical evacuation between French Guiana and mainland France. It demonstrates the robustness and safety of this technique and the ability of the healthcare team to adapt in a constrained environment. It thus paves the way for consideration of the systematic inclusion of PD in pediatric emergency evacuation protocols and for better equipping local facilities to respond to pediatric nephrological emergencies [10, 11].

A strategic lever for strengthening pediatric nephrology in French Guiana

Several authors have emphasized the importance of developing viable and realistic alternatives to heavy-duty techniques in French Guiana, particularly for nephrological care at home or for children [4, 12]. This case shows that PD can be integrated as a key tool in the regional nephrology strategy pending the wider development of specialized services. This requires, however, investment in training pediatric teams, the creation of standardized protocols, and the provision of ready-to-use equipment, even in isolated settings.

Conclusion

In regions with limited access such as French Guiana, peritoneal dialysis is a strategic treatment modality. This clinical case demonstrates that its rapid and safe implementation, including in flight, is not only feasible but also life-saving.

Authors' contributions

AMB, MB, MS, SB, TD, ID, and TFG contributed to the clinical management of the patient and data collection. MB, AMB, and TFG drafted the manuscript. MS, SB, TD, and ID participated in critical revision and improvement of the content. All authors approved the final version of the manuscript and agree to take responsibility for it.

Ethical considerations

The informed consent of the infant's parents was obtained for the publication of this case report. All procedures described complied with the ethical principles of the Declaration of Helsinki. No information that could identify the patient has been disclosed.

Acknowledgments

The authors would like to thank the pediatric surgery team at the Guyana University Hospital, the nursing staff in the pediatrics and nephrology departments, and the EVASAN team in Guyana for their professionalism.

journal officiel du Registre de Dialyse Péritonéale de Langue Française RDPLF www.rdplf.org

https://doi.org/10.25796/bdd.v8i3.87084
ISSN 2607-9917

Funding

The authors did not receive any funding for this publication.

Conflicts of interest

The authors declare no conflicts of interest.

ORCID iDs
Arriel Makembi Bunkete https://orcid.org/0000-0001-9651-437X

References

1. Uber AM, Sutherland SM. Acute kidney injury in hospitalized children: consequences and outcomes. Pediatr Nephrol [Internet]. 2020 Feb 1 [cited 2025 Jul 4];35(2):213-20. Available from: https://doi.org/10.1007/s00467-018-4128-7

2. Gupta S, Sengar GS, Meti PK, Lahoti A, Beniwal M, Kumawat M. Acute kidney injury in Pediatric Intensive Care Unit: incidence, risk factors, and outcome. Indian J Crit Care Med [Internet]. 2016 Sep [cited 2025 Jul 4];20(9):526-9. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5027745/

3. Sutherland SM, Ji J, Sheikhi FH, Widen E, Tian L, Alexander SR, et al. AKI in hospitalized children: epidemiology and clinical associations in a national cohort. Clin J Am Soc Nephrol. 2013 Oct;8(10):1661-9. Available from: DOI: 10.2215/CJN.00270113. Epub 2013 Jul 5. PMID: 23833312; PMCID: PMC3789331.

4. Jetton JG, Rhone ET, Harer MW, Charlton JR, Selewski DT. Diagnosis and treatment of acute kidney injury in pediatrics. Curr Treat Options Peds [Internet]. 2016 Jun 1 [cited 2025 Jul 4];2(2):56-68. Available from: https://doi.org/10.1007/s40746-016-0047-7

5. de Galasso L, Picca S, Guzzo I. Dialysis modalities for the management of pediatric acute kidney injury. Pediatr Nephrol. 2020 May;35(5):753-765. doi: 10.1007/s00467-019-04213-x. Epub 2019 Mar 18. PMID: 30887109.

6. Kaddourah A, Basu RK, Bagshaw SM, Goldstein SL, AWARE Investigators. Epidemiology of acute kidney injury in critically ill children and young adults. N Engl J Med. 2017 Jan 5;376(1):11-20. Available from: DOI: 10.1056/NEJMoa1611391. Epub 2016 Nov 18. PMID: 27959707; PMCID: PMC5322803

7. De Rosa S, Marengo M, Fiorentino M, Fanelli V, Brienza N, Fiaccadori E, et al. Extracorporeal blood purification therapies for sepsis-associated acute kidney injury in critically ill patients: expert opinion from the SIAARTI-SIN joint commission. J Nephrol [Internet]. 2023 [cited 2025 Jul 4];36(7):1731-42. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10543830/

8. Bunkete AM. Home hemodialysis in French Guiana: transforming logistical challenges into healthcare opportunities. Bull Dial Domic [Internet]. 2025 Jun 7 [cited 2025 Jul 4];8(2):107-11. Available from: https://bdd.rdplf.org/index.php/bdd/article/view/87069

9. Cullis B, Al-Hwiesh A, Kilonzo K, McCulloch M, Niang A, Nourse P, et al. ISPD guidelines for peritoneal dialysis in acute kidney injury: 2020 update (adults). Perit Dial Int. 2021 Jan;41(1):15-31. Available from: DOI: 10.1177/0896860820970834. Epub 2020 Dec 3. PMID: 33267747

10. Nourse P, Cullis B, Finkelstein F, Numanoglu A, Warady B, Antwi S, et al. ISPD guidelines for peritoneal dialysis in acute kidney injury: 2020 update (paediatrics). Perit Dial Int. 2021 Mar;41(2):139-157. Available from: DOI: 10.1177/0896860820982120. Epub 2021 Feb 1. PMID: 33523772

11. Bechara R, Ranchin B, Zaloszyc A. Peritoneal dialysis in children: pathophysiological approaches, prescription and management of complications for adequate treatment. Bull Dial Domic [Internet]. 2025 Jun. 7 [cited 2025 Jul. 28];8(2):113-24. Available from: https://bdd.rdplf.org/index.php/bdd/article/view/87081

journal officiel du Registre de Dialyse Péritonéale de Langue Française **RDPLF** www.rdplf.org

https://doi.org/10.25796/bdd.v8i3.87084
ISSN 2607-9917

12. Vasudevan A, Phadke K, Yap HK. Peritoneal dialysis for the management of pediatric patients with acute kidney injury. Pediatr Nephrol [Internet]. 2017 Jul 1 [cited 2025 Jul 4];32(7):1145-56. Available from: https://doi.org/10.1007/s00467-016-3482-6

13. Bunkete AM, Kasonga PK, Fermigier F, Djiconkpode I. WCN25-137 Pediatric nephrology in French Guiana: overview and outlook. Kidney International Reports [Internet]. 2025 Feb 1 [cited 2025 Jul 4];10(2):S615. Available from: https://www.kireports.org/article/S2468-0249(24)03115-2/fulltext

14. Huang YH, Chou CM, Huang SY, Chen HC. Pediatric emergent peritoneal dialysis in intensive care units: indications, techniques, and outcomes. Blood Purif. 2024;53(8):676-685. Available from: DOI: 10.1159/000539512. Epub 2024 May 26. PMID: 38797161

Received 2025/07/04 accepted after revision 2025/08/01 published 2025/09/15