Sociedad Española de Nefrología

nefrología

Revista de la Sociedad Española de Nefrología

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Letter to the Editor

Beyond the zero-liquid discharge: Consider a "fit for purpose" water philosophy in hemodialysis

Más allá de la descarga de líquido cero: considere una filosofía de agua "adecuada para su propósito" en hemodiálisis

Dear Editor:

We read with great interest the article entitled "Towards zero liquid discharge in hemodialysis. Possible issues" by Tarrass et al.

In this report, the authors have described a strategic wastewater management system that is expected to lead to zero liquid discharge (ZLD) inside hemodialysis units. The ZLD plan as developed by the authors could be deployed at three levels. The first one is a well-known issue related to the huge amount of water necessary to provide hemodialysis as renal replacement therapy (500 L of feed water to perform a 4 h HD session). At this level, reusing reverse osmosis (RO) reject water as proposed by the authors, is definitely to be a good attitude. This high-quality RO reject water is fit for multiple purposes such as Toilet flushing, garden watering, cooling water for sterilizers, irrigation of landscape. Two biological parameters are set by the authors for this purpose, the total dissolved solids (TDS) and sodium adsorption ratio (SAR) allowing the establishment of an "RO reject water reusing" algorithm. At the two following levels, authors discuss possible reusing and regeneration of the dialysate fluid. Processes such reverse osmosis coupled with nanofiltration are the cornerstone technologies for reusing dialysate effluent while sorbent dialysis system is expected to reconstitute a safe and efficient dialysate effluent.[1]

We congratulate the authors for their commitment to raise the issue of hemodialysis water supply in the context of global warming and growing water scarcity and to propose these technical solutions in order to reduce water consumption.

Nevertheless, we have a few comments on this important report. We believe that, any water economy should be based on a waste hierarchy that prioritizes first, all reduction tools able to decrease water consumption. Hence, when all reduction efforts are exhausted, then, reuse water opportunities should be carefully studied. At the last level recycling used water represents a reasonable but costly option.[2]

During the last decades, innovative water treatment and dialysis technologies have contributed to perform significant economy in water consumption. Several reports have shown that the updating of the water treatment system could lead to cut water consumption by half. Furthermore, recent designed RO system is able to calculate total water consumption.[3]

On the other hand, with the new dialyzers designed to enhance dialysate flow distribution, reduction in dialysate flow rates is becoming an alternative set on the table. Multiple studies underlined the fact that decreasing dialysate flow (Qd) from 500 to 400 ml/min might allow important water economy without altering dialysis quality (maintaining acceptable Kt/v, and phosphorus and B2 microglobulin clearances). In the same vein, some dialysis machine software (such as autoflow and ecoflow) are reported to contribute to water economy.[3]

Reusing the dialysate effluent water remains challenging. Although there is no evidence of environmental contamination, the cost and a theoretical risk of such activity represent a serious obstacle to scheduled dialysate effluent reusing.[4]

In conclusion, the number of hemodialysis patients is expected to double by 2030 (around 5,000,000 patients) which represents a real burden for water resources.[5] Because of global warming, countries from both sides of the Mediterranean Sea such as Spain and Morocco are expected to struggle with serious and prolonged drought periods. Facing such a threatening situation, we have to improve not only our knowledge of dialysis technologies but also to develop how to implement audit process, regulatory framework, and staff education in order to promote a "fit for purpose" water philosophy in hemodialysis.

Once again, we congratulate the authors for discussing such a relevant and very important topic.

Conflict of interest

All the authors of this article declare no conflict of interest.

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https://doi.org/10.1016/j.nefroe.2021.06.006

Fibrillary glomerulonephritis simulating glomerular basal antimembrane antibody disease with associated thrombotic microangiopathy and ANCAp

Glomerulonefritis con depósitos fibrilares simulando enfermedad por anticuerpos antimembrana basal glomerular con microangiopatía trombótica asociada y ANCAp

Mr. Director:

Fibrillary glomerulonephritis (FGN) is a glomerular disease with organized deposits of immunoglobulins, negative Congo red staining and 16–24 nm fibrils visible in electron microscopy (EM). The clinical syndrome in these patients is variable: nephritic or nephrotic syndrome, microhematuria, hypertension, renal failure and, rarely, rapidly progressive glomerulonephritis (RPG), pulmonary hemorrhage or thrombotic microangiopathy (TMA).[1–6] We describe a FGN, with RPG, pulmonary hemorrhage, and positive ANCAp and TMA.

Female, 51 years old, with no relevant medical history, consults for dyspnea and edema. On examination, blood pressure 170/100 mmHg, sinus rhythm, crackles in both lung bases and edema. Hemogram and blood chemistry: normocytic normochromic anemia, without microangiopathic hemolytic anemia (MHA), creatinine 6 mg/dl, nephrotic proteinuria with normal serum albumin and microhematuria. Chest X-ray: bilateral interstitial infiltrate, with diagnosis of pulmonary hemorrhage with immunological study with ANCAp positive 1/320, rest normal/negative, including anti-glomerular basement membrane antibodies. Plasmapheresis, corticosteroids and intravenous cyclophosphamide were started. One week after admission, MHA with smear showing schistocytes and undetectable haptoglobin, with negative stool culture, normal ADAMTS13, we decided to start eculizumab treatment, with normal genetic follow-up Renal biopsy: 49 glomeruli, 10 sclerosed, 29 with epithelial crescents, some with segmental necrosis, PAS and Jones silver positive. No signs of TMA. Direct immunofluorescence was strongly positive for IgG with linear pattern, kappa and lambda positive, weak C3 with parietal and mesangial granular pattern, IgG4 positive (Fig. 1).

At hospital discharge, the patient presented remission of pulmonary hemorrhage and resolution of MHA, creatinine of 3.8 mg/dl, proteinuria and microhematuria, and continued treatment with cyclophosphamide, corticosteroids and eculizumab up to 2 months after resolution of MHA. Thirty days after discontinuation of eculizumab, she presented a new episode of probable TMA and the ME result was received: dense deposits, in glomerular basement membrane (GBM) and mesangium, consisting of random fibrils, with an average thickness of 18.41 nm, compatible with fibrillary glomerulopathy, with linear IgG deposits (Fig. 1).

DOI of original article:
https://doi.org/10.1016/j.nefro.2021.03.009.