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Research Article

Peritoneal Dialysis in Emergency in Children:Mono Centric Study in a Service of Adult Nephrology of Eastern Algeria

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Abstract

Introduction: Urgent peritoneal dialysis (PD) is very often the only possible technique for extra-renal dialysis in children in developing countries, mainly due to a lack of adequate hemodialysis equipment.

Patients and methods: Over a period of 4 years (2015-2018) we identified 36 children who required emergency PD, including 14 girls and 22 boys, the average age is 42 months (range 1month to 9 years), the average weight of 14.6 kg (3.1 kg to 25 kg). The technique used is the continuous acute DP with a Tenckhoff catheter, the volume of the intra peritoneal dialysate and the stasis times are in accordance with the European guidelines of 2014, the solutes used are the isotonic and punctually more concentrated solutions. All these parameters vary from one patient to another according to the desired objective.

Result: Of our 36 young, 23 had acute kidney injury AKI (02 septic shock, 09 tubular necrosis, 10 hemolytic and uremic syndromes, 02 obstructive AKI that were difficult to derivate), 13 with end stage chronic kidney disease CKD(congenital uropathy), the mean KT / V was 3.9 and the average UF 3.6 ml / kg / h, we had only two deaths due to complications of the initial pathology (septic shock), We did not have leaks or peritonitis, the most frequent complication was paradoxically hypokalemia (55% of cases), for AKI recovery of renal function was total in 100% of cases, for 13 cases of end stage CKD shift to chronic DP and pre-renal transplant checkup is the rule.

Discussion: Our results are encouraging; the management of dialysis emergencies in children in an adult nephrology service is a real challenge. A motivated and available technical platform has adapted to their care, emergency PD in children is increasingly present in our daily lives.

Conclusion: Emergency PD in children is not only a necessity imposed by the lack of pediatric hemodialysis equipment, but a method in itself and very effective.

Keywords: Algeria; Acute peritoneal dialysis; Children; Dialysis emergencies

Introduction

Peritoneal dialysis was widely accepted for the treatment of acute uremia, but its practice has gradually declined in favor of new techniques of extra-renal dialysis including continuous hemodiafiltration [1], it remains widely used in developing countries because of its low cost and minimal infrastructure requirements. This is especially true for pediatric cases [2]. A renewed interest in acute PD has developed in recent years following several studies comparing the results of this technique versus intermittent hemodialysis and continuous hemodiafiltration in adult AkI [3-5] and the child [6-12], giving back to the acute peritoneal dialysis its titles of nobility and it is all the more true in the pediatric population; This technique of easy access especially in emergency is very suitable for children in multivisral failure including cardiovascular, usable regardless of age or weight, including newborns and premature babies. [13,14] It brings nephrologists, resuscitators and pediatricians together for the same purpose. It has long been considered the method of choice for children in AKI [15]. It remains in some centers the only saving technique available of extreme urgency. [16,17].

Patients and Methods

It is a prospective study in a center of adult nephrology in eastern Algeria, spanning four years (January 2015 to January 2018) and thus including 36 children in dialysis emergency, controlled exclusively by the acute PD.

The choice of acute PD is based on hemodynamic stability on the one hand, and on the availability of hemodialysis equipment adapted to the age group and weight on the other. Tenckhoff catheter surgery is performed under general anesthesia by a referring pediatric surgeon. We use a Y system (the child stays connected until the bag is used up) in order to avoid the multiplication of manipulations to minimize the risk of infection. 500 IU/bag of heparin and 1 gr/ pouch of 3rd generation cephalosporin is administered in the 2liter PD bag systematically the first 48H.(Figure 1&2) We used the manual method (continuous acute PD), with 10 ml/kg/ exchange and a stasis of 30 min the first 24 hours, then progressive increase to a maximum of 30 ml/kg / cycle (maximal intra-peritoneal pressure at 10 cmH_2o) for infants and at 50 ml/kg/cycle (maximum intraperitoneal pressure at 14 cmH_2o) for children over 2 years of age. This Protocol complies with the 2014 European guidelines [18]. The maximum volume infused is determined by respiratory tolerance and clinical symptoms for each child. The stasis time is gradually increased to 3 hours on the second day. The punctual use of the intermediate or hypertonic pockets is decided on a case by case basis if the needs of the water balance of the child were not satisfied. Strict clinical monitoring with input-output and biological balance with daily assessment to evaluate the effectiveness of dialysis (KT/V calculation and evaluation of UF ultrafiltration obtained).

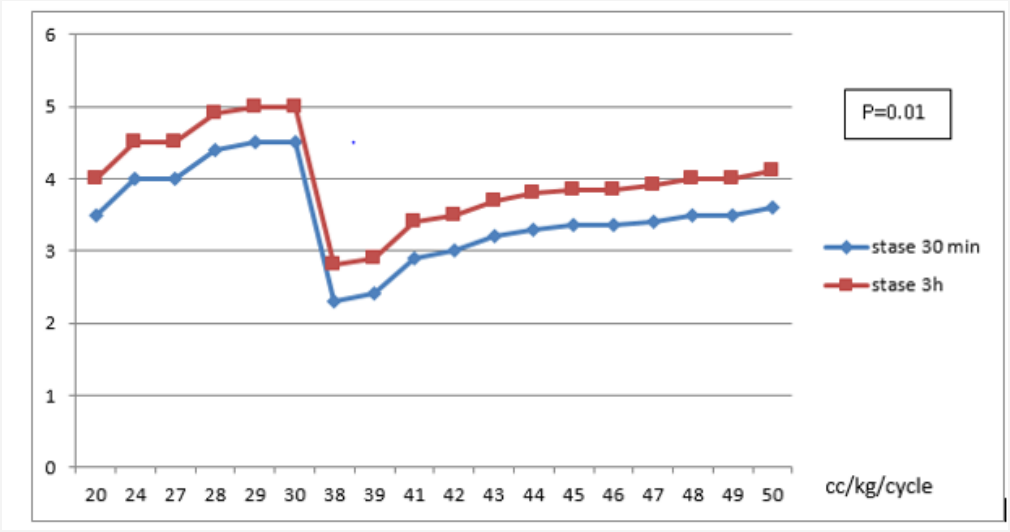

Figure 1: KT/V rate according to maximum permissible VIP and stasis time (Statistics processed by SPSS software from the data of our cohort).

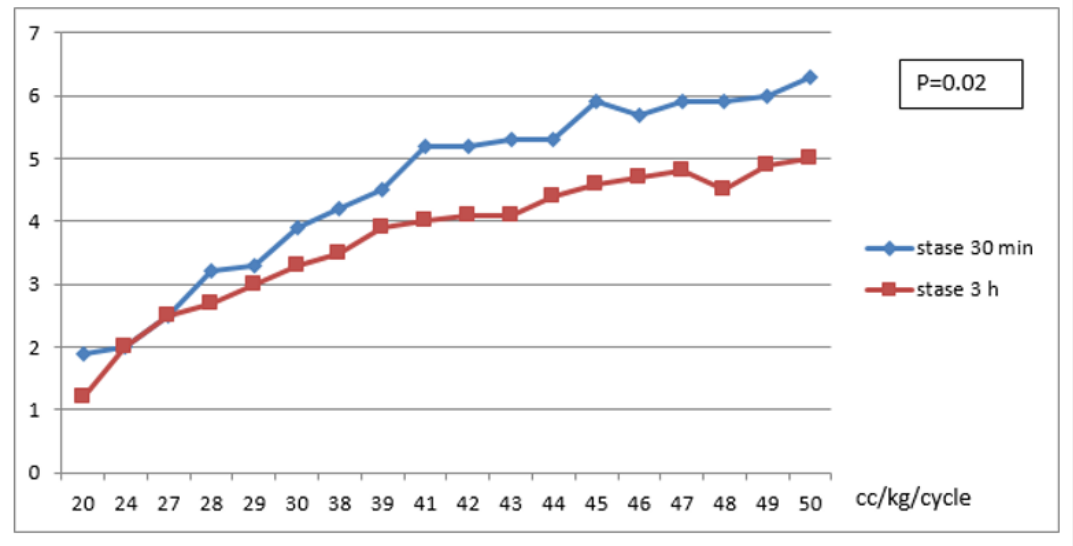

Figure 2: UF ml/kg/h rate according to maximum permissible VIP and stasis time (Statistics processed by SPSS software from the data of our cohort).

Result

Our cohort includes 36 pups, including 14 girls and 22 boys (sex ratio of 1.57), the average age is 42 months (range 1month to 9 years), and the average weight is 14.6 kg (3.1 kg to 25 kg). 23 suffered from acute kidney injury AKI (02 septic shock, 09 tubular necrosis, 10 hemolytic and uremic syndromes and 02 obstructive

AKI difficult to derivate) and 13 end stage chronic kidney disease CKD (congenital uropathy). According to the pediatric RIFLE classification 15 patients out of the 23 ARI were classified at the stage of failure (65%), and 8 at the stage of injury (35%) at the time of the decision to start the acute PD. The improvement of the clinical state was real and perceptible every time after a few hours(Figure 3).

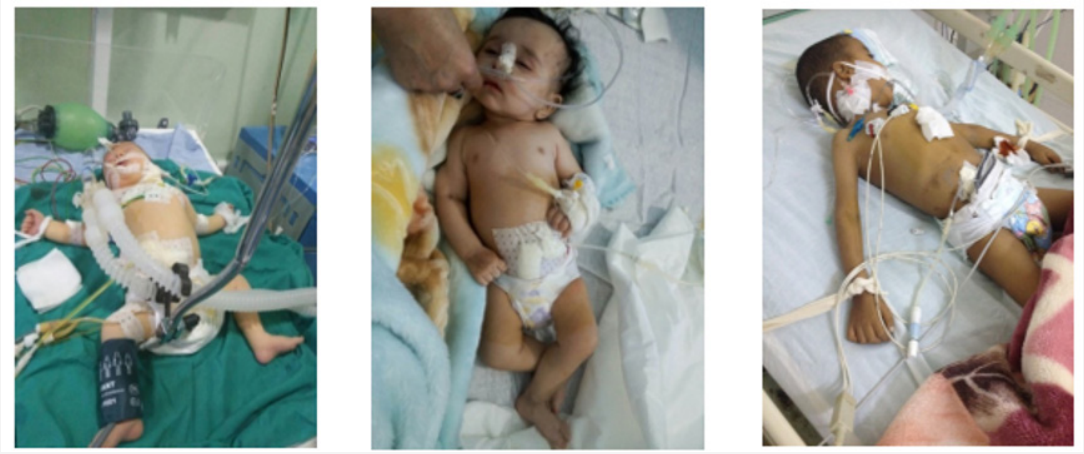

Figure 3: 3 Children in our cohort benefiting from acute DP through Tenckhoff catheters.

The mean KT / V was 3.9, influenced by the intra peritoneal VIP volume that appears to be an intra-individual trait (p = 0.01), the higher the tolerated VIP is increased the better KT / V (p = 0.001), by the age the rate seems better in infants (p = 0.02), and by stasis time, KT / V is higher in stases long than 3 h (p = 0.01). The average UF is 3.6 ml / kg / h, influenced by the intraperitoneal volume (VIP), the higher the tolerated VIP is increased the better the UF (p = 0.002), the more children over 2 years (p = 0.03), and by stasis time, UF is higher in short staples of 30 min (p = 0.025). We had only two deaths (5%) following the complications of the initial pathology (septic shock), We did not have any mechanical or infectious complications; the most frequent complication was paradoxically hypokalemia (55% of cases) easily controlled by potassium supplementation of 4 mmol/l of intraperitoneal dialysate. For AKI recovery of renal function was complete in 100% of cases, for cases of end stage CKD the transition to chronic DP and pre-renal transplant assessment is the rule.

Discussion

Depending on the facilities and skills available, PD, intermittent hemodialysis and hemodiafiltration are currently used for pediatric dialysis emergencies [9,19]. Hemodiafiltration and hemodialysis require vascular access, equipment, technical skills and financial resources [20-22], which limits their use due to unavailability in most centers in developing countries, including ours of a material suitable for different pediatric age groups, especially for children under 15 kg. Our series consists of 13 end stage CKD and 23 AKIs summarized by 10 SHUs, 09 NTAs, 2 urological AKIs and 2 AKIs related to septic shock. Mechanical complications were non-existent and peritoneal infection avoided each time. The improvement of the clinical state was real and perceptible every time after a few hours. The quantification of the dialysis dose made possible by maintaining the same pocket until the dialysate is exhausted. The biological parameters improve slowly except the frequent declaration of a real hypokalemia requiring adapted intraperitoneal supplementation. Ultrafiltration is measured progressively by a heavy calibrated dedicated to the only patients. The efficacy of the treatment is real in 95% of cases, quickly perceptible pending renal function recovery in acute patients, monitored by diuresis and measurement of solutes. International studies, some of which are more extensive (higher number of patients) do not widen the gap with our results. Compared to African studies [23-25], our working conditions are much better in logistics for similar results. PD is a simple technique to master in an undemanding infrastructure that is an effective means of treatment everywhere even in the poorest areas. On the other hand, it requires a qualified medical and paramedical staff motivated and available to achieve the same results as hemodiafiltration and intermittent hemodialysis.

Conclusion

Our results are quite encouraging, the management of dialysis emergencies in children in an adult service is a real challenge, a whole technical platform motivated and available adapted to their care, the DP in emergency in the child is more and more present in our daily life. The originality of this work comes down to the fact that it is the first done in our country. We strongly believe that our experience can serve as an example for other teams of nephrologists who could save many children with DP being used more and more in acute settings in developing countries.

Acknowledgment

None.

Conflict of Interest

We do not declare any conflict of interest.

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