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Pediatric RRT of severe hyperosmolality and AKI

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Introduction: Management of AKI and hyperosmolality using conventional renal replacement methods places patient at higher risk of rapid osmolar shifting that leads to major neurological consequences. CRRT provides the ability to control rate of reduction in osmolality by allowing the adjustment of dialysate solution and narrowing osmolar gap between the patient and dialysate. Further, inefficient solute clearance will less the rate of pH and osmolar changes over time.

Case Presentation: A 16-kg male child with known case of Central Diabetes Insipidus presented unconscious and anuric with septic shock, anemic (Hb 4.8 g/l), AKI (BUN 427 mg/dl, Creatinine 7.6 mg/dl), severe hyponatremia (Na 216 mmol/l), and a PH of 7.0. Measured osmolality was 593 osmols/l. Patient was resuscitated, incubated and shifted to PICU. Inefficient CVVHD using PrismaSate® was begun at 8 mls/kg/hr with an additional 80 meq/l of NaCl to give total Na of 220 meq/L, resulting in a dialysate bath of 550 osmols/l. Patient osmols were recalculated at 3 hours increments and additional Na in the dialysate was decreased as needed.

Results: Based upon patient osmolar changes, additional sodium was adjusted until normal osmols were obtained. Over 72 hours the child had gradual drop of sodium till reaching 170 mmol/l then CVVHD was stopped and patient was shifted to medical treatment of hyponatremia. Over time, patient had recovery of osmols, PH, renal and neurological function and continued on medical management.

Conclusions: To our best knowledge, this is the first case in literature to have such presentation and manage by this way. The patient presented with severe hyperosmolality and significant metabolic acidosis. A rapid correction of either of these conditions places him at risk for herniation and pontine demyelination. Utilizing a slow approach to osmolar and pH corrections is recommended in the literature to avoid these risky complications. Standard dialysis dosing of 35 mls/kg/hr or 2000 mls/m²/hr will result in significant solute clearance. By making the CVVHD prescription inefficient, one can then do a slow correction of the metabolic acidosis and with manipulation of the sodium bath of the dialysate one can narrow the osmolar gap between the patient and dialysate allowing for slow and continuous correction of the osmolality.

Biography

Loai A Eid is a Consultant and Head of Pediatric Nephrology Department at Dubai Hospital since 2013. He has done Pediatric Residency and completed Fellowship in Pediatric Nephrology from the Children's National Medical Center, Washington DC in 2013. Additionally, he has obtained Master of Science degree in Health Science (Clinical & Translational Research) from George Washington University in 2013. He is serving as a Lecturer and Examiner at Dubai Medical College and Adjunct Instructor in Pediatrics at The George Washington University. He has published articles in well-known international journals. He is a Member of the International Pediatric Transplant Association, International Pediatric Nephrology Association, the American Society of Pediatric Nephrology and the American Academy of Pediatrics among others. He is actively involved in clinical researches nationally and internationally.

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