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Continuous renal replacement therapy as a treatment for severe acute hypernatremia induced by central diabetes insipidus

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Case Study : Hypernatremia induced by central diabetes insipidus (CDI) is usually managed with oral or intravenous administration of free water, along with the replacement of vasopressin. We used continuous renal replacement therapy(CRRT) for a case of severe acute hyponatremia developed immediately after coronary artery bypass graft (CABG) surgery, where meticulous volume control is critical and oral water intake is not feasible.
A 78-year-old female patient underwent CABG due to 3 vessel disease. The laboratory data at the time of admission was Na 142 mEq/L, K 4.9 mEq/L, Cl 111 mEq/L, and serum creatinine 0.76 mg/dl. Urine specific gravity(SG) was 1.010. She has a history of polydipsia and polyuria for more than 10 years without history of stroke nor head trauma. The patient's serum sodium had been maintained within normal range by increased oral water intake. Attending surgeon was unaware of this history and overlooked low urine SG before CABG. Surgical course was uneventful and blood flow at anastomosis was intact. The total fluid input including transfusion during the operation time of 5 and a half hours was 6,400 ml, urine output was 1,770 ml, and estimated blood loss was about 1000cc. During 12 hours after surgery, output including urine was 8,300 ml and input was 4,000 ml. The patient was consulted to nephrology division for comatose mentality and a serum sodium more than 200meq/L, which is the highest measurable value by our laboratory. Presumed diagnosis of diabetes insipidus was made by the history taken from the patient's family. We started fluid replacement with 5% D/W and vasopressin, but with no change in serum sodium after 4 hours of fluid replacement. Since it was difficult to calculate free water deficit precisely because of uncheckable sodium concentration, and meticulous control of volume and electrolyte is urgently needed for this post-CABG patient, we initiated continuous veno-venous hemodiafiltration with initial blood flow set as 120 ml/min, pre-replacement flow rate 600ml/hr, dialysate flow 600ml/hr, post replacement flow rate 400ml/hr, and ultrafiltration rate was 0. Initial dose of effluent flow rate was 21.3 ml/min/kg, increased to 32.0 ml/min/kg with close monitoring of serum sodium concentration. Because of the concern of sodium loss through CRRT with resultant volume depletion, sodium concentration of dialysate was adjusted initially at 180 mEq/L, slowly stepped down to 140mEq. We diagnosed her as having central type diabetes insipidus since urine osmolality increased from 137 to 362 mosm/L by nasal

desmopressin. Central venous pressure was maintained between 6cm and 7cm at the third day after CABG. The patient's sodium reach to 142mEq/L and mentality recovered. There was no neurologic sequelae and serum creatinine was 0.8 mg/dL at discharge
CRRT may be an option to control acute severe hypernatremia, in a situation where rapid and proper correction of volume and electrolyte is critical.

Keywords : hypernatremia, CRRT, Central diabetes insipidus