Maintenance Intravenous Fluid and Hyponatraemia: Old values may be the culprit

Madam, maintenance intravenous fluid (MIVF) is the most common medical intervention children receive during their hospitalization.[1] MIVF is administered to expand extracellular fluid volume, replace the physiological plus insensible losses of water and electrolytes from urine, stool, skin and respiratory tract. Dextrose 5% mixed in 0.22% or quarter normal saline (39mEq/L of sodium chloride) (D5W 0.2% NS) is the most common fluid used as MIVF among paediatric patients in a hospital setting. The rate of administration is based on an hourly, caloric and weight-based formula prescribed by Holliday and Segar in 1957.[1]

Several reports have demonstrated that the administration of traditional hypotonic saline (D5W 0.2%NS) caused hyponatraemia in 25% of hospitalized children with devastating consequences.[2] The most serious complication of hyponatraemia is acute encephalopathy which leads to cerebral oedema and intracranial hypertension. This in turn can cause cerebellar herniation, moreover if left unrecognized and untreated it subsequently leads to mortality. Since the early symptoms of cerebral oedema are non-specific like headache, vomiting and lethargy, this entity may be difficult to recognize and may lead to delayed diagnosis. As compared to adults, children are at a higher risk of hyponatraemic encephalopathy due to their relatively large brain to intracranial volume ratio. Given the risk it is imperative to prevent development of hyponatraemia in paediatric patients by diligent management of fluid and electrolyte balance and

appropriate use of MIVF. Multiple factors (osmotic and non-osmotic) i.e. pain, nausea, fever, respiratory distress, neurological dysfunction and post-operative states, can put all hospitalized children at a risk of excessive endogenous anti-diuretic hormone (ADH) production. Administration of large volume of hypotonic fluid like D5W0. 22% NS in the presence of excess endogenous ADH may thus be the main factor contributing to hospital-acquired hyponatraemia.[2]

Hospital-acquired hyponatraemia and its related death in children, being a preventable risk, has drawn attention of the hospital safety committees worldwide. In 2007 National Patients Safety Agency (NPSA) in United Kingdom[3] and subsequently in 2009 Institute of Safe Medical Practice (ISMP) in Canada and US have issued a warning against the use of hypotonic fluid as a maintenance therapy in hospitalized children.

In 2003, Moritz et al recommend that isotonic fluids (D5W0.9%NS or 0.9%NS) should be used as maintenance intravenous fluid for prevention of hyponatremia in hospitalized children.[4] Recently, a multicenter prospective randomized study demonstrated that use of isotonic solution as a maintenance fluid in critically ill children decreased the frequency of hospital-acquired hyponatremia.[5] This and several other studies have also shown that the use of isotonic fluids as MIVF is safe and is not associated with hypernatraemia, hypertension or renal failure. It is time to consider the use of D5W 0.9%NS as a MIVF in hospitalized children.

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