Hyponatremia Common but Tricky to Treat

BY SHERRY BOSCHERT

SAN FRANCISCO — Physicians may be lulled into a false sense of competence in managing hyponatremia simply because the disorder is so common in hospitalized patients.

"Hyponatremia is difficult," said Dr. Lewis S. Blevins, director of the Center for Pituitary Disorders and professor of medicine and neurosurgery at the university. "If you're not totally comfortable" managing hyponatremia, "get a consult."

Up to 15% of hospitalized patients develop hyponatremia, defined as a serum sodium level below the lower limit of normal. Clinically significant hyponatremia—defined as a serum sodium level below 130 mEq/L—has an incidence of 1% and a prevalence of 2.5% in hospitalized patients, he said at a meeting on diabetes and endocrinology sponsored by the University of California, San Francisco.

A review of 104 patients with hyponatremia (serum sodium under 125 mEq/L) in a Liverpool, England, hospital who were treated in one 6-month period using textbook criteria for diagnosis and management, with no consultation from endocrinologists, revealed incorrect diagnoses in 42% of patients and significant management errors in 33%. Among patients with management errors, 41% died, compared with 20% of patients who were managed appropriately (Postgrad. Med. J. 2006;82:216-9).

The symptoms and signs of hyponatremia are common to many other disorders—most frequently headache, nausea or vomiting, delirium or confusion, weakness, lethargy, cramps, dizziness, or dysarthria. Simply suspecting hyponatremia in this clinical scenario will get you halfway to the correct diagnosis, Dr. Blevins said.

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One common management error is to correct the sodium level too rapidly or too slowly, he said. For patients with acute hyponatremia (with marked brain edema and minimal brain volume regulation), get the sodium level up quickly, because the risks from the hyponatremia outweigh the risks of rapid correction.

For chronic hyponatremia (any case in which the time of onset of the disorder cannot be determined), choosing fast or slower sodium correction is a coin toss. These patients have some brain edema but the brain has regulated its volume somewhat. "You need to be careful, but don't be afraid to get that sodium up," he said.

Slow down your sodium management in patients with chronic asymptomatic hyponatremia, who have minimal brain edema and no CNS symptoms. Raising the sodium level too quickly can cause the brain to lose too much water, leading to central demyelination syndrome. That can cause mutism, lethargy, behavioral changes, confusion, difficulty moving, and a host of other problems.

To reduce the risk of demyelination when treating chronic hyponatremia, try to limit the sodium correction rate to 10-12 mmol/L in 24 hours and to 18 mmol/L in 48 hours. Don't exceed a correction rate of 10 mEq/L per 24 hours if there are other risk factors for myelinosis such as hypokalemia, liver disease, poor nutritional status, or burns. Central demyelination almost never occurs in patients who have excess urea from renal failure.

A more rapid correction rate of roughly 1-2 mEq/L per hour is acceptable for initial treatment of acute hyponatremia.

Reserve the use of 3% hypertonic saline for patients with acute hyponatremia and significant neurologic symptoms, Dr. Blevins stressed. For acute cases of euvolemic hyponatremia (the most common type), aiming for a correction rate of 1.5 mEq/L per hour during no more than 3-4 hours of using 3% saline "almost always gets the sodium where you want it," he said.

To calculate the 3% saline infusion rate in milliliters per hour, he multiplies the desired correction rate (1.5) by the patient's lean body weight in kilograms. For a 70-kg patient, the infusion rate would be 105 mL/h.

Interrupt acute treatment if the patient's symptoms resolve, a safe serum sodium is achieved (usually above 120 mEq/L), or the total magnitude of correction reaches 10-12 mEq/L even if the serum sodium level remains below 120 mEq/L, he said.

Dr. Blevins is a speaker for Astellas, which markets conivaptan. ■

Caution: Hypotonic Fluids

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ter outpatient tonsillectomy and adenoidectomy. Hyponatremic signs and symptoms—vomiting, lethargy, jerking movements, rigid extremities, and rolled-back eyes—were mistaken for a dystonic reaction to an antiemetic that had been administered, according to a report by the Institute for Safe Medication Practices (ISMP Medication Safety Alert! 2009 Aug. 13;14[16]).

Clinicians continued to follow the incorrect electronic medication administration record after the child vomited dark, bloody secretions. The patient's symptoms continued to worsen after she was admitted to a medical-surgical unit. A pediatrician who was consulted to manage the patient's seizures diagnosed hyponatremia and water intoxication. A lab study revealed a critically low sodium concentration of 107 mEq/L (the normal range is 135-147 mEq/L). The child later died of cerebral edema.

"Many hospitals, including my own, have taken the D5W and keep it only in the pharmacy, so it can't be readily accessed and can only be obtained by a physician's order that has to go all the way to the pharmacy and be checked," Dr. Hain said.

Computerized order entry forms also could have been used to calculate the maintenance rate of saline infusion, he noted.

Dr. Shannon Phillips, patient safety officer at the Cleveland Clinic, said that hypotonic intravenous fluids could be removed from the list of available computerized order entry options for pediatric patients. Alternatively, the order entry system could be set up to alert the prescriber and ask about the decision, referencing why hypotonic fluids or certain medications might be inappropriate. Alerts also could be sent to the pharmacist and the nurse who administers the fluid or medication.

Even when computerized order entry is not available, it's possible to develop care pathways and protocols for postoperative surgical care and other situations, said Dr. Phillips, a pediatric hospitalist at Cleveland Clinic Children's Hospital.

Such protocols are equally helpful in large tertiary care centers and in community hospitals that have a small number of pediatric beds and medical teams primarily involved in adult care, she said in an interview.

In the second case, a boy on postoperative day 1 after surgery for coarctation of the aorta was prescribed furosemide for low urine output after several doses of ethacrynic acid (Edecrin). The next day, the boy was prescribed a sodium chloride infusion for a low serum sodium level, but it is unclear if the infusion ever occurred because it was not documented in the patient's medication administration record.

The boy became less and less responsive, and despite repeated concerns expressed by his parents, nurses thought the unresponsive boy was "simply sleeping soundly." New seizurelike activity—attributed by the nurses to the child to being fidgety from pain—and other symptoms of hyponatremia were not reported promptly to the attending physician, who later recognized the problem during a routine assessment. By that time, it was too late to prevent the child's death.

These cases also point to the benefits of safety systems such as "rapid-response teams that anyone in the medical care team, including the parents, can activate," and of having a group of hospitalists who are easily available for consultation, Dr. Hain said.

Studies that included children and adults have shown that within 1 week of surgery, more than 4% of postoperative patients and 30% of patients treated in ICUs develop clinically significant hyponatremia. One study of the problem found more than 50 cases of neurologic morbidity and mortality in a 10-year period in children who received hypotonic saline parenteral fluids (Pediatrics 2003;111:227-30). ■

Inpatients on Insulin Have Elevated Risk of Falling

SAN DIEGO — Insulin was a surprise among the medications commonly associated with inpatient falls in a large single-center controlled study of 230 patients.

"Previous community studies have found a connection between diabetes and falling. In our study, diabetes was not associated with falling, but use of insulin was. The question is whether insulin is a marker of more severe diabetes, or if these patients have low blood sugars or peripheral neuropathy that is increasing the risk of falling," said Caroline O'Neil, research coordinator in the infectious diseases division at Washington University, St. Louis.

Patients taking a combination of hydantoins and insulin had an 11.4-fold increased risk of falling.

MS. O'NEIL

Patients who fell were more likely than controls who did not fall to be taking hydantoin anticonvulsants (odds ratio 3.6), haloperidol (OR 3.4), benzodiazepines (OR 2.1), and insulin (OR 1.5). Certain combinations of medications increased the risk even more, especially the combination of hydantoins and insulin (OR 11.4) and benzodiazepines and haloperidol (OR 5.7). The data were presented in a poster at the annual meeting of the Society for Healthcare Epidemiology of America.

In the study, led by Dr. Victoria J. Fraser, the researchers evaluated 230 inpatients who had fallen at Barnes Jewish Hospital in St. Louis. The study also included 690 control patients who did not fall. The mean age of patients who fell was 62 years, 54% were male, and their average length of stay was 12 days.

The study was funded with grant support from the National Institutes of Health and the Centers for Disease Control and Prevention. Ms. O'Neil said that she had no financial conflicts to disclose.

—Doug Brunk