Barbiturates May Falsely Increase Serum Sodium Levels



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Introduction

Barbiturates are used as a third tear therapy in intracranial hypertension refractory to medical treatment. In our center we observed a high percentage of hypernatremia in patients treated with barbiturates.

Methods

We performed a retrospective study of 53 patients treated with barbiturates (thiopental) in our intensive care unit between 2007 and 2011 and evaluated electrolyte changes. Standardized in vitro laboratory tests were performed to study the effect of thiopental on sodium analysis. We further compared the values obtained on the central laboratory (CL) device versus the bedside point-of-care (POC) device.

Results

The sodium levels were much higher on the CL device than on the POC device (+11.57 mmol/L, P < .0001). In the standardized in vitro tests thiopental induced a dose-dependent false hypernatremia (P = .002). Further exploration revealed that these erroneous values were related to the Siemens Dimension Vista 1500 central lab auto-analyzer.

Conclusions

Barbiturates may cause false hypernatremia when assayed with a particular CL device. Clinicians treating patients with intracranial hypertension should be aware of this possible interference. Otherwise, the risk exists that elevated sodium levels may result in withholding essential treatments with hypertonic saline or mannitol for raised ICP.





Image above: Retrospective in vivo study of 53 patients treated with thiopental—The presence of thiopental in serum caused extremely false hypernatremia in a dose-ependent fashion when determination of sodium was performed on the Dimension Vista (Pdosage effect <.0001). These effects were not seen when sodium was determined on the Vitros system.

Image on the left: Illustrative case report—Within 2 days of initiating barbiturate therapy in this patient with TBI, severe hypernatremia developed with a clear discrepancy between sodium levels measured at the bedside (red line) and in the central laboratory (blue line).This difference resolved a couple of days after stopping the thiopental infusion. Thiopental concentration peaked on the 12th with 39.4 μ g/mL and decreased below the therapeutic range (<20 μ g/mL) on the 15th.