Correspondence

Inappropriate perioperative fluid management in children: time for an isotonic solution?!

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Sir—In his editorial 'Inappropriate perioperative fluid management in children: time for a solution?!' Lönnqvist (1) recommended a solution containing 0.9% glucose and 120 mmol·l^{-1} of sodium (2) as an almost 'fool-proof' and 'golden compromise'. We agree that such a solution should contain firstly a glucose concentration (i.e., 1–2%) high enough to avoid hypoglycemia and low enough not to cause significant hyperglycemia and secondly an electrolyte pattern and osmolarity very close to normal physiological extracellular levels. But is the proposed solution really 'golden' when it comes to overcoming iatrogenic hyponatremia and acid–base disorders? First, the *in vitro* osmolarity (the sum of cations and anions including glucose: 307 mosmol·l^{-1}) of the proposed solution is nearly identical to that of 'normal' saline (308 mosmol·l^{-1}). What counts, however, is the osmolarity that is effective *in vivo* rather than that measured *in vitro* (3). Glucose enters very rapidly into the intracellular space to be metabolized there and, therefore, *in vivo* the solution becomes clearly hypotonic (256 mosmol·l^{-1}). Second, the lactate concentration of the solution (20.7 mmol·l^{-1}) is below the physiological bicarbonate concentration (24 mmol·l^{-1}). *In vivo*, lactate metabolism leads to the release of equimolar amounts of bicarbonate and, therefore, theoretically a high volume infusion of this solution may produce dilutional acidosis. Third, for stabilization of the acid–base status, acetate may be preferable to lactate because it is metabolized significantly faster, more independently of hepatic function, with a lower increase in oxygen consumption and no interference with the diagnostic use of lactate as a marker of low tissue perfusion. From our point of view an almost 'fool-proof' solution should be really isotonic with a physiological electrolyte pattern and acetate as a bicarbonate precursor in order to prevent acid–base imbalances. Would it not be more rational to use perioperatively such an isotonic electrolyte solution with 1% glucose added (6 ml glucose 40% in 250 ml isotonic solution)? Indeed, this has proved to be an almost 'fool-proof' solution in many of our children's hospitals for several years and we, in fact, recommended it in our recent guidelines (4). Unfortunately, it has not been possible to find a pharmaceutical company that would be willing to take up this idea because in this case, the cost of clinical studies necessary for approval will be greater than the potential return on investment. Therefore, we filed an application for standard approval with the German regulatory agency, 'Bundesinstitut für Arzneimittel und Medizinprodukte', Bonn, Germany, and this application is currently under regulatory review!

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