was negligible. Our results are consistent with the study by Sonntag (2), which showed that the concentrations of potassium and lactate dehydrogenase in serum are affected by hemoglobin concentrations ≥0.2 g/L.

Unexpectedly, we measured a 2.4% increase in Mg²⁺ concentrations in the Greiner samples. We assumed that optical interference of hemoglobin caused the artifactual increase in Mg²⁺ in these samples. Hypomagnesemia is associated with alcoholism, pancreatitis, gastrointestinal diseases, glomerulonephritis, hyperthyroidism, hyperparathyroidism, metabolic acidosis, and drug administration. Furthermore, in patients with acute myocardial infarctions, serum Mg²⁺ <0.82 mmol/L may increase the risk of ventricular arrhythmia.

Falsely increased concentrations of Mg²⁺ might then be a concern if the Greiner system is used. Presumably, in such cases the Mg²⁺ assay with an ion-selective electrode is preferable to the spectrophotometric method.

The 8% increase in PT values after blood collection with the Greiner system (Table 1) may be a result of interference with clot formation. We assume that membrane phospholipids exposed by the slight erythrocytolyis may compete with the PT reagent (thromboplastin) used for the assay of extrinsic pathway factors, causing prolongation of PT. It is also possible that the different composition of the coagulation tubes (glass in the BD vs plastic in the Greiner) may have affected the results.

Although the degree of hemolysis was significantly higher in the Greiner system than in the BD system, all test results remained within the reference intervals for the young healthy individuals in our study. However, in hospitalized patients, qualitative differences in blood analytes may be accentuated, particularly when intra-vascular erythrocyte destruction is expected to occur, such as in bacterial or viral infections (5), hypersplenism, cardiac and hepatic abnormalities (6), exposure to venoms and toxins (6), and the use of oxidant drugs (7).

Obviously, the decision of which blood-collection system (or systems) should be used in a healthcare center depends on considerations of cost, safety, and convenience. Along with these considerations, it is appropriate to document the effect of a specific system on laboratory test results.

References


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Autoimmune Hypoglycemia Presenting as Seizure One Week after Surgery

To the Editor:

A 72-year-old Caucasian man was admitted to our hospital in November 1999 for reanastomosis of an ileostoma that had been created after perforation of a sigmoid diverticulum with peritonitis. The past medical history of the patient was unremarkable except for angioneurotic edema of unknown etiology 14 years previously. The immediate postoperative course was uneventful, and the patient received glucose (400 g/L, 40 mL/h) via a central line. Because it was planned to reestablish enteral nutrition on day 7, glucose infusions were discontinued during the preceding night. At 0500 on day 7, the patient had a generalized seizure. Bedside testing revealed a nondetectable blood glucose concentration. After the patient received 100 mL of a glucose solution (500 g/L), the seizures stopped. During the following 24 h, his glucose concentration repeatedly fell to <2.8 mmol/L, requiring glucose administration; 36 h after the initial hypoglycemia, the patient was on full enteral nutrition, and glucose concentrations remained stable.

A serum sample obtained 1 h after the seizure revealed an extremely high insulin concentration (1746 mIU/L; reference interval, 6–35 mIU/L; IMX Insulin; Abbott) and a serum glucose concentration of 4.3 mmol/L, whereas C-peptide was increased approximately twofold above the upper reference limit (8.8 µg/L; reference interval, 0.8–4.0 µg/L; Immulite C-Peptide; DPC). In subsequent samples, insulin concentrations were lower, but they were still 5- to 15-fold above the upper reference limit. A computed tomography, obtained preoperatively, did not reveal a pancreatic mass.

To exclude an analytical artifact of insulin determination, samples were reanalyzed in serial dilutions up to 1:32 and with a different assay (Count-a-coat Insulin; DPC); this confirmed extreme hyperinsulinemia. Serum insulin antibodies (RIA) were 88 kilounits/L (reference interval, 0–5). On the basis of these findings, autoimmune hypoglycemia (AIH) (1) was suspected.

To confirm the diagnosis, the patient was evaluated by an oral glucose challenge (75 g) after full recovery from surgery. Glucose intolerance was observed with a serum glucose of 13.0 mmol/L after 60 min; insulin was increased to a peak concentration of 3162 mIU/L after 180
min, and symptomatic hypoglycemia occurred after 240 min (glucose, 1.8 mmol/L), at which point the study was terminated (Fig. 1). Consequently, the patient was advised to eat at least six small meals per day and to avoid meals rich in quickly absorbed carbohydrates. In addition, he and his family were informed about the management of hypoglycemia.

Insulin autoantibodies are common in patients receiving exogenous insulin, but they can also be observed in individuals never treated with insulin, particularly in patients with autoimmune diseases [up to 30% (2)]. However, very few patients develop symptomatic hypoglycemia. It is assumed that in these cases, glucose administration causes excessive insulin response because the antibodies buffer most of the insulin secreted. When glucose concentrations return to normal, large amounts of antibody-bound insulin remain in the plasma and subsequently dissociate from the antibodies, leading to hyperinsulinemia (1). When glucose is administered in this situation (as in the initial event in our patient), hyperinsulinemia may be amplified, leading to further hypoglycemia several hours later.

AIH was first described in 1972 by Hirata and Ishizu (3). Serum insulin concentrations typically are extremely high in AIH and distinctly higher than in insulinoma. Almost 90% of reported AIH cases are from Japan (4); this is explained by the increased susceptibility to AIH of individuals with the HLA-DR4 allele DRB1*0406, which has a high prevalence in Japan (5). In other patients, AIH frequently is associated with gammopathies (4, 6). The serum electrophoresis and immune fixation technique in the case presented here disclosed discrete monoclonal IgG-λ. Tests for antinuclear and antithyroid antibodies were negative; thyroid-stimulating hormone was 3.1 mIU/L. The differential diagnosis of hypoglycemia with high insulin concentrations includes exogenous insulin, sulfonyl-ureas, insulinoma, and AIH. However, in all conditions but AIH insulin concentrations are 10-fold lower.

The hypoglycemia in AIH can usually be controlled by dietary measures. However, some patients require immunosuppressive therapy or even pancreatic resection (1, 4).

Our case demonstrates that AIH is a rare but important cause of life-threatening hypoglycemia. To the best of our knowledge, this is the first reported case of AIH presenting as a life-threatening complication in the postoperative period after discontinuation of parenteral nutrition.

References

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