Evaluation of a Continuous Blood Glucose Monitoring System Using Central Venous Microdialysis

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Abstract

Background:

Glycemic control in critically ill patients has been shown to be beneficial. In this prospective study, we evaluated the accuracy and technical feasibility of a continuous glucose monitoring system using intravascular microdialysis.

Method:

Fifty patients undergoing cardiac surgery were monitored using a 4 Fr intravenous microdialysis catheter (Eirus SLCTM, Dipylon Medical AB, Solna, Sweden) percutaneously placed with the tip of the catheter positioned in the superior vena cava. The catheter was connected to the EirusTM monitoring system, and the patients were monitored for up to 48 h postoperatively in the intensive care unit (ICU). As reference, arterial blood samples were taken every hour and analyzed in a blood gas analyzer.

Results:

Data were available from 48 patients. A total of 994 paired (arterial blood gas microdialysis) samples were obtained. Glucose correlation coefficient (R^2) was 0.85. Using Clarke error grid analysis, 100% of the paired samples were in region AB, and 99% were in region A. Mean glucose level was 8.3 mmol/liter (149 mg/dl), mean relative difference was 0.2%, and mean absolute relative difference was 5%. A total of 99.2% of the paired samples were correct according to International Organization for Standardization (ISO) criteria. Bland–Altman analysis showed that bias ± limits of agreement were 0.02 ± 1.1 mmol/liter (0.36 ± 20 mg/dl).

Conclusions:

Central venous microdialysis using the Eirus monitoring system is a highly accurate and reliable method for continuous blood glucose monitoring up to 48 h in ICU patients undergoing cardiac surgery. The system may thus be useful in critically ill ICU patients.

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Abbreviations: (CGM) continuous glucose monitoring, (CVC) central venous catheter, (EGA) error grid analysis, (ICU) intensive care unit, (IIT) intensive insulin therapy, (ISO) International Organization for Standardization, (NICE-SUGAR) Normoglycemia in Intensive Care Evaluation— Survival Using Glucose Algorithm Regulation, (SD) standard deviation, (SLC) single lumen catheter, (TGC) tight glycemic control

Keywords: critically ill patients, glucose monitoring, glycemic control, microdialysis

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