Propofol and Remifentanil Effect-site Concentrations Estimated by Pharmacokinetic Simulation and Bispectral Index Monitoring During Craniotomy With Intraoperative Awakening for Brain Tumor Resection

Lobo, Francisco MD; Beiras, Aldara MD

Abstract

Different anesthetic techniques have been suggested for craniotomy with intraoperative awakening. We describe an asleep-awake-asleep technique with propofol and remifentanil infusions, with pharmacokinetic simulation to predict the effect-site concentrations and to modulate the infusion rates of both drugs, and bispectral index (BIS) monitoring. Five critical moments were defined: first loss of consciousness (LOC₁), first recovery of consciousness (ROC₁), final of neurologic testing (NT), second loss of consciousness (LOC₂), and second recovery of consciousness (ROC₂). At LOC₁, predicted effect-site concentrations of propofol and remifentanil were, respectively, 3.6±1.2 μg/mL and 2.4±0.4 ng/mL. At ROC₁, predicted effect-site concentrations of propofol and remifentanil were, respectively, 2.1±0.3 μg/mL and 1.8±0.3 ng/mL. At NT, predicted effect-site concentrations of propofol and remifentanil were, respectively, 0.9±0.3 μg/mL and 1.8±0.2 ng/mL. At LOC₂, predicted effect-site concentrations of propofol and remifentanil were, respectively, 2.1±0.2 μg/mL and 2.5±0.2 ng/mL. At ROC₂, predicted effect-site concentrations of propofol and remifentanil were, respectively, 1.2±0.5 μg/mL and 1.4±0.2 ng/mL (data are mean±SE). A significative correlation was found between BIS and predicted effect-site concentrations of propofol ($r^2=0.547, P<0.001$) and remifentanil ($r^2=0.533, P<0.001$). Multiple regression analysis between BIS and propofol and remifentanil predicted effect-site concentrations at the different critical steps of the procedure was done and found also significative ($r^2=0.7341, P<0.001$).