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Journal of Neurosurgical Anesthesiology:

July 2007 - Volume 19 - Issue 3 - pp 183-189

doi: 10.1097/ANA.0b013e31805f66ad

Clinical Reports

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

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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 (LOC_1), first recovery of consciousness (ROC_1), final of neurologic testing (NT), second loss of consciousness (LOC_2), and second recovery of consciousness (ROC_2). At LOC_1 , predicted effect-site concentrations of propofol and remifentanil were, respectively, 3.6 ± 1.2 $\mu\text{g/mL}$ and 2.4 ± 0.4 ng/mL . At ROC_1 , predicted effect-site concentrations of propofol and remifentanil were, respectively, 2.1 ± 0.3 $\mu\text{g/mL}$ and 1.8 ± 0.3 ng/mL . At NT, predicted effect-site concentrations of propofol and remifentanil were, respectively, 0.9 ± 0.3 $\mu\text{g/mL}$ and 1.8 ± 0.2 ng/mL . At LOC_2 , predicted effect-site concentrations of propofol and remifentanil were, respectively, 2.1 ± 0.2 $\mu\text{g/mL}$ and 2.5 ± 0.2 ng/mL . At ROC_2 , predicted effect-site concentrations of propofol and remifentanil were, respectively, 1.2 ± 0.5 $\mu\text{g/mL}$ and 1.4 ± 0.2 ng/mL (data are mean \pm SE). A significant 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 significant ($r^2=0.7341$, $P<0.001$).

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