

Methods for case report:

EEG collection, cleaning, and pre-processing:

The raw EEG waveform and burst suppression ratio (BSR) were collected using the standard frontal electrode strip from the Entropy Module (GE Healthcare, Chicago, IL, USA)). All EEG analyses were conducted in MATLAB (2021b).

The raw EEG (sampling frequency 100Hz) was detrended and high (0.1Hz) and low (50Hz) pass-filtered using 3rd-order Butterworth filters. The EEG spectrogram was computed using the multitaper method in the Chronux toolbox <http://chronux.org/> (with a moving window of 4 sec, step size of 1 sec, time-bandwidth (TW: 2, and number of tapers (k): 3). The resulting spectrum values were converted to decibels (dB) and then logarithmically transformed. Then, the alpha (8-14 Hz) and delta (1 Hz) power bands were extracted, and average alpha and delta power were calculated.

Effect site drug concentrations:

Effect-site drug concentrations were calculated as follows:

1. For fentanyl effect-site concentration, a two-compartment model was used ($K_{eo} = 0.147/60$, $Q = 2.3/60$, $V_1 = 13 * \text{weight}/70$, $V_2 = 358 * \text{weight}/70$, $\text{Clearance} = 0.62/60$).¹
2. Propofol effect-site concentrations were calculated using a two-compartment model ($K_{eo} = 1/150$, $Q = 0.989/60$, $V_1 = 24 * \text{weight}/70$, $V_2 = 112 * \text{weight}/70$, $\text{Clearance} = 2.64/60$).²
3. The desflurane effect site was calculated from end-tidal MAC measurements, assuming a $K_{eo} = 0.0048 /s$ (rate constant).³

References:

1. Shafer SL, Varvel JR, Aziz N, Scott JC. Pharmacokinetics of Fentanyl Administered by Computer-controlled Infusion Pump. *Anesthesiology*. 1990;73(6):1091-1102. doi:10.1097/00000542-199012000-00005
2. Wiczling P, Bienert A, Sobczyński P, et al. Pharmacokinetics and pharmacodynamics of propofol in patients undergoing abdominal aortic surgery. *Pharmacol Rep PR*. 2012;64(1):113-122. doi:10.1016/s1734-1140(12)70737-5
3. McKay IDH, Voss LJ, Sleight JW, Barnard JP, Johannsen EK. Pharmacokinetic-pharmacodynamic modeling the hypnotic effect of sevoflurane using the spectral entropy of the electroencephalogram. *Anesth Analg*. 2006;102(1):91-97. doi:10.1213/01.ane.0000184825.65124.24