

VEP dynamics in rats under anaesthesia with sevoflurane

Summary: In this study we chose to compare VEPs obtained under anaesthesia with sevoflurane or chloral hydrate. We focused on latency and amplitude variation of peaks N1, P1 and N2.

Introduction: VEP recordings offer a measure of nervous conduction through the entire visual pathway, from the optic nerve to the occipital cortex. VEPs are composed of specific peaks and their alterations point towards events taking place in specific neuronal relay stations. As VEPs are a measure of impulse conduction velocity, they are highly susceptible to suppression of cortical activity through anaesthetics. Thus they have been proposed as a quantitative parameter for anaesthetic depth. In our study, we sought to compare the patterns of variation of peak morphology between the two anaesthetics. We chose to investigate the effects of sevoflurane on VEPs in part due to the scarcity of studies related to the topic and the frequency of use of sevoflurane as an anaesthetics agent.

Materials and methods: The study was conducted on three Wistar Male rats weighing around 300 grams at implantation. We opted for nichelcrom wire chronic implants. After implantation, the animals recovered for a week before the first EEG recording procedure. The visual impulse was provided by a flash light and the animal was shielded from sound and light during the experiment. We proceeded to recording of VEPs post anaesthesia induction at successive anaesthetic depths.

Results: The latency of peak N2 under sevoflurane exhibited a greater degree of variability than under chloral hydrate. Under sevoflurane, peak N2 was positively correlated with anaesthetic depth, in comparison to peaks P1 and N1 that were negatively correlated with MAC values. Under chloral hydrate, all three peaks, N1, P1 and N2 were negatively correlated with MAC values. The results were statistically significant ($p < 0,005$).

Conclusions: The latency of peak N2 of the visual evoked potential exhibits a different behaviour under sevoflurane than under chloral hydrate.

References:

1. Nakagawa I, Hidaka S, Okada H, Kubo T, Okamura K, Kato T : Effects of sevoflurane and propofol on evoked potentials during neurosurgical anesthesia; *Masui*. 2006 Jun;55(6):692-8
2. Kodama K, Goto T, Sato A, Sakai K, Tanaka Y, Hongo K : Standard and limitation of intraoperative monitoring of the visual evoked potential; *Acta Neurochir (Wien)*. 2010 Apr;152(4):643-8
3. Tonner PH, Bein B: Classic electroencephalographic parameters: Median frequency, spectral edge frequency etc; *Best Pract. & Res. Clin. Anaesth. Vol. 20, No. 1, 147–159, 2006*
4. A. Kumar, A. Bhattacharya and N. Makhija: Evoked potential monitoring in anaesthesia and analgesia; *Anaesthesia, 2000, 55, pages 225–241*
5. Jäntti V, Yli-Hankala A. : Neurophys. of anaest.; *Clin. Neurophys. at the Beginning of the 21st Century (Supplement to Clin. Neurophys. Vol. 53, chapter 11)*