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BISPECTRAL INDEX, AUDITORY EVOKED POTENTIALS AND HEART RATE VARIABILITY DURING CORONARY ARTERY BYPASS SURGERY.

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Introduction: The EEG bispectral index (BIS) and auditory evoked potentials (AEP) are both used in monitoring of the hypnotic component of anesthesia¹. Assessment of the depth of anesthesia in cardiac surgery is still a challenge, since BIS may not be an accurate indicator of the depth of anesthesia in cardiac surgery when opiates or benzodiazepines are used^{2,3}. We studied AEP and heart rate variability (HRV) during cardiac surgery. The depth of anesthesia was titrated to target constant BIS values using isoflurane or propofol for maintenance of anesthesia.

Patients and methods: After receiving institutional ethics committee approval and written informed patient consent, 24 patients, scheduled for elective coronary artery bypass grafting (CABG) were enrolled. Patients were randomized to one of the two groups: in Group P anesthesia was maintained with propofol (n=12) and in Group I with isoflurane (n=12). Anesthesia was induced with propofol, alfentanil and pancuronium. After intubation, in Group P propofol infusion was started with minimum infusion rate 50 mg/h and in Group I the minimum isoflurane concentration was 0,2% and BIS value was kept between 40 and 60 in both groups. Alfentanil was continuously infused using open-loop plasma target controlled infusion pump. For cardiopulmonary bypass (CPB) we used non-pulsatile pump flow and membrane oxygenation under moderate hypothermia at 34°C. For middle latency AEP (MLAEP) measurement EEG module included in CS/3 monitor (Datex-Ohmeda, Helsinki, Finland) was used with two channel recording. MLAEP measurements were performed at seven time points: 1. before induction of anesthesia (baseline) 2. after induction of anesthesia 3. before CPB 4. during cardiopulmonary perfusion after aortic cross-clamp 5. during the CPB 6. after opening of the aorta 7. after operation. Electrocardiogram signal for HRV analysis was obtained three times before CPB. Continuous BIS recording was started before induction of anesthesia (A-2000™, Aspect Medical System). Haemodynamics were recorded with personal computer. In the first postoperative morning all patients were interviewed for evaluation of intraoperative awareness and recall of intraoperative events. For statistical analysis, analysis of variance and Mann-Whitney test was used.

Results: There were no differences between the groups in demographic and baseline variables. The Nb parameter of MLAEP was longer in Group I than in Group P after induction of anesthesia and before CPB (Fig.1, *p<0.001). At the same time points, HRV and BIS (Fig. 2) were similar among Groups P and I. In Group P three patients had Nb values less than 44.5 ms. The groups were similar with respect to haemodynamic variables or need for vasoactive drugs during surgery. No patient reported recall of intraoperative events.

Fig.1

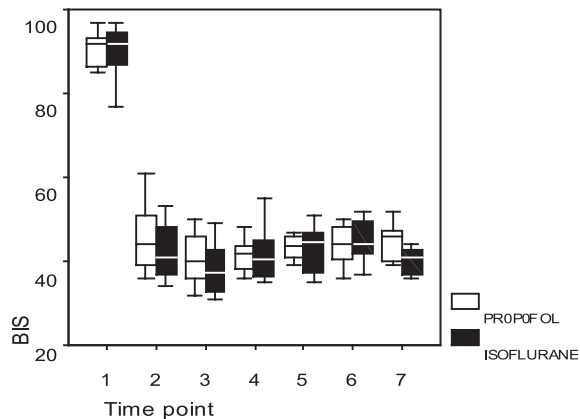
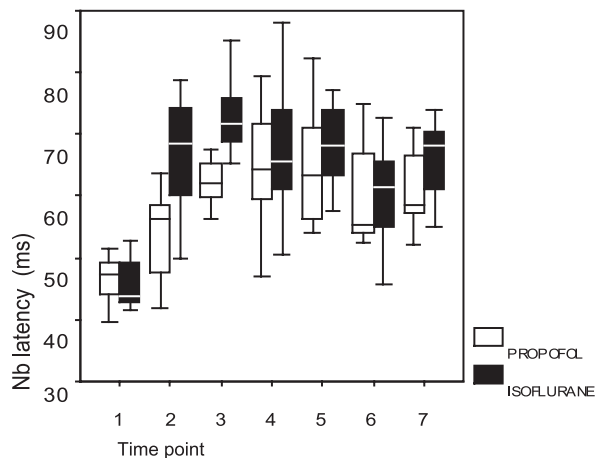


Fig.2



Conclusion: The results of this study suggest that BIS is less accurate than MLAEP in monitoring of depth of anesthesia in CABG, when anesthesia is maintained with isoflurane or propofol.

References:

1. Anesthesiology 2000; 93:876-82
2. Acta Anaesthesiol Scand 2000; 44:807-811.
3. Br J Anaesth 2000; 84: 749-52