

A Pilot study on Heart Rate Variability (HRV) during an inhalation bolus technique with sevoflurane or desflurane (preliminary results)

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Introduction: High desflurane concentrations can cause sympathetic stimulation.¹ The ratio of the low and high frequency components (LF and HF) of HRV obtained after Fourier transformation, is a non invasive tool to detect changes in the sympathetic tone². The aim of this pilot study was to demonstrate the ability of LF/HF ratio to detect changes in sympathetic tonus and to show that the LF/HF ratio during high desflurane concentrations is not different compared to high concentrations of sevoflurane and propofol.

Methods: After Institutional Ethics Committee approval, written informed consent was obtained from 18 ASA I patients scheduled for minor non laparoscopic surgery. Following induction with remifentanyl 4 ng.ml⁻¹, propofol (300ml .hr⁻¹ until loss of consciousness) and rocuronium (0.9mg.kg⁻¹ IBW), patients were randomised into 3 groups (n=6) to receive BIS-guided TCI propofol, desflurane or sevoflurane (targeted to BIS-value 45 –55. If BIS > 55: FGF 4L/min vaporizer full output for 15 sec or target TCI +25%) combined with TCI remifentanyl initiated at 4 ng/ml and guided 25% up or 25% down by hemodynamic responses, maintaining mean arterial pressure and heart rate within 20% of baseline. Groups were compared for LF/HF ratio at different timepoints: awake, intubation, before (baseline) and during bolus administration. Normality of distributions was tested with one-sample Kolmogorov-Smirnov and statistical analysis was performed by using Paired Samples T-test and One way ANOVA with post-hoc Tukey test where applicable.

Results: When comparing awake versus intubation timepoints, within group analysis showed a significant increase in LF/HF ratio in all groups. Between group analysis showed no differences. (Fig 1) When comparing baseline versus period of bolus administration, within group analysis showed highly significant increases in LF/HF ratio in all groups. Between group analysis showed a higher baseline ratio in the propofol group compared to the desflurane group. The ratio during bolus administration were similar (NS between groups).

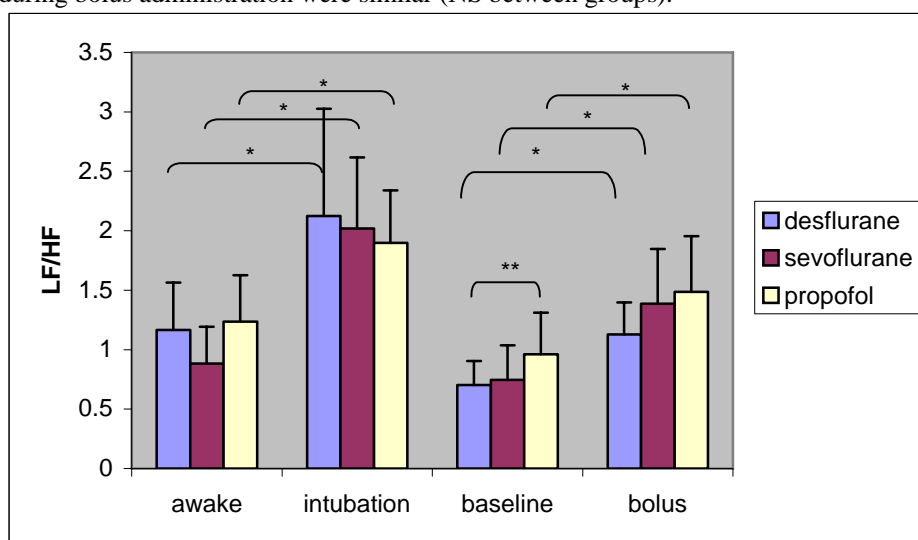


Fig 1: LF/HF ratio(mean (SD))

*p<0.05 within groups

**p<0.05 between groups

Discussion: The reports of sympathetic activation were originally described during desflurane mono-anesthesia. Opiates are known to blunt this sympathetic activation³. HRV values are reported to be higher under equipotent (BIS guided) propofol anesthesia. The changes in LF/HF ratio coincided with changes in BIS values.

Conclusion: LF/HF ratio is a proper tool to demonstrate changes in sympathetic activity. High concentrations of desflurane combined with remifentanyl do not cause higher sympathetic activity than high concentrations of sevoflurane or propofol. Bolus administration of desflurane is safe in the context of this study.

References:

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3. Daniel M et al. Fentanyl augments the blockade of the sympathetic response to incision (MAC-BAR) produced by desflurane and isoflurane: desflurane and isoflurane MAC-BAR without and with fentanyl. *Anesthesiology* 1998; 88: 43-9.