

A379

October 13, 2012

8:00:00 AM - 11:00:00 AM

Room Hall C-Area D

Vascular Impedance, BIS, Heart Rate Variability, and Pulse Wave Velocity During Surgical Stress

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Introduction:

Among basic elements of anesthesia care, the monitoring system for analgesia has not yet been accomplished. We previously proposed the peripheral vascular impedance monitoring [1], which reflects the effects of anesthesia and surgical stress transferred via sympathetic nerve, while its property in comparison to electroencephalography and to heart rate variability (HRV) analysis has not been evaluated. The present investigation evaluates the responses of encephalography and peripheral vascular impedance by surgical stress.

Methods:

Approved by the local ethical committee and with written informed consent from the participants, 10 patients (15-37 yr) with hyperhidrosis receiving endoscopic thoracic sympathetic block under sevoflurane-fentanyl general anesthesia were enrolled. Electrocardiogram (ECG), direct radial arterial pressure (dAP), plethysmograph (PLS) (BSS-9800, Nihon Kohden Corp), BIS (A-2000 EEG monitor, Aspect Medical Systems), and power spectral analysis of HRV (LF: low frequency power at 0.04-0.15Hz, HF: high frequency power at 0.15-0.4Hz, TP: total power at 0.04-0.5Hz, LF/HF) using maximum entropy method (MemCalcTM, Tarawa, Suwa Trust) were monitored. Vascular impedance (stiffness: K) and pulse wave velocity (PWV) were computed from the waves of ECG, dAP and PLS (LabVIEWTM, National Instruments Corp) [1-3]. The patients were positioned in head up tilt and the surgery was carried out after induction of pneumothorax with CO₂ insufflation. BIS, HRV K and PWV were measured before as pre-values and after surgical incision. HRV and K were evaluated after logarithmic conversion. In comparison with pre-values, data are expressed as percentile changes (mean±SD). The significance of difference was determined using t-test and a p<0.05 was regarded as significant.

Results:

Surgical incision increased K but not LF, HF, LF/HF, TP, BIS and PWV (Figure 1).

Conclusion:

Peripheral arterial impedance, or stiffness may respond to surgical stress than BIS and HRV. Further study is required to reveal the availability under different surgical stress.

References:

- [1] Journal of Robotics and Mechatronics 2004; 16, 138-145
- [2] Hiroshima Journal of Medical sciences 2009; 58, 75-82
- [3] Medical and Biological Engineering and Computing 2010; 48, 351-359

Figure 1

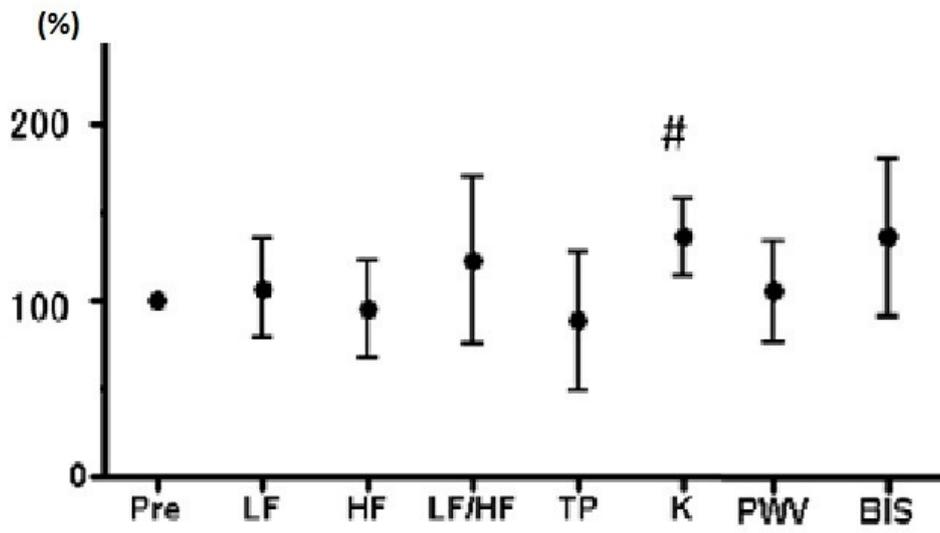


Figure 1.
Data are expressed as % compared with the data before surgery (Pre)
$p < 0.05$