

Selected Thoracic Abstracts:

Br J Anaesth. 2008 Dec;101(6):870-5. Epub 2008 Oct 3.

Significant decrease of cerebral oxygen saturation during single-lung ventilation measured using absolute oximetry.

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BACKGROUND: Single-lung ventilation (SLV) during thoracic surgery causes important cardiopulmonary disturbances. Absolute cerebral oximetry was used to determine the incidence and magnitude of the decrease in cerebral oxygen saturation (SctO₂) in patients undergoing SLV during thoracic surgery.

METHODS: Data were obtained from 20 consecutive patients undergoing thoracic surgery and necessitating SLV of more than 1 h. The FORE-SIGHT® (CASMED, USA) absolute oximeter was used to measure left, right, and average absolute SctO₂ every 5 min from the awake state to extubation. Bispectral index and standard monitoring parameters were also recorded every 5 min. Blood gas analysis was performed every 15 min. Data median (IQR) (range) were analysed using repeated-measures anova and Spearman's correlation test, P<0.05.

RESULTS: Patients [median age 65 yr (range 46-75)] showed an absolute SctO₂ of 80% (78, 82) (74-87) in the awake state, which decreased to a minimum SctO₂ value of 63% (57, 65) (53-73) during SLV to recover to a SctO₂ of 71% immediately after extubation. During SLV, all patients had a decrease of more than 15% of the initial SctO₂ and 70% of patients had a decrease of more than 20%. The decrease in SctO₂ was not correlated with any standard clinical parameters, for example, arterial pressure, blood loss, peripheral oxygen saturation, or PaCO₂. **CONCLUSIONS:** Thoracic surgery with SLV seems to be associated with a significant decrease of SctO₂ in the majority of patients. Parameters such as peripheral oxygen saturation or Po(2) which are used to guide SLV during thoracic surgery are not sufficient to detect significant cerebral oxygen desaturations.

Br J Anaesth. 2009 Jan;102(1):141-2.

Inter-hemispheric cerebral oxygen saturation differences during thoracic surgery in lateral head positioning.

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Introduction: Absolute cerebral oximetry (FORE-SIGHT®, CASMED, USA) is a novel method of measuring cerebral oxygen saturation (SctO₂); it detects SctO₂ without the need for pre-induction baseline measurement. One study showed little bilateral differences in FORE-SIGHT SctO₂ measurements for cardiac patients with no known

carotid disease (1). However, these results were obtained from subjects in supine position. The aim of the present study is to assess inter-hemispheric SctO₂ gradients in patients undergoing thoracic surgery in the lateral position.

METHODS: Local REB approval was obtained for this study. In 29 consecutive patients, SctO₂ was continuously measured during lung resection in the lateral position using the FORE-SIGHT 2-channel absolute oximeter. Data points were discarded if one of the signals was unstable or not available. Data were analyzed in SAS and compared between the two hemispheres; comparisons were made between upper or lower hemisphere according to the side of surgery.

RESULTS: A total of 29 patients (lateral position L/R = 9/20) and 941 5-min blocks were collected. After exclusion of 43 periods with no or unstable signal in one hemisphere, 898 5-min periods were included in the final analysis. 22% of data were prior to SLV, 59% during SLV periods and 9% after SLV ventilation. SctO₂ of the upper hemisphere was higher in 56% of cases, equal in 18% and lower than the lower hemisphere in 26%. On average, SctO₂ in the upper hemisphere was 1.3% higher than the lower hemisphere (95% CI of the mean 1.06 - 1.49, $P < 0.0001$). When SctO₂ was low, there was no significant difference. With higher values of SctO₂, the upper hemisphere shows significantly higher SctO₂ than the lower. The inter-hemispheric SctO₂ difference increased by 0.038 +/- 0.017% for each 1% increase in SctO₂ ($p < 0.03$). **Discussion:** The lower hemisphere has generally a lower SctO₂. Impaired venous return gradient and higher cerebral venous blood volume may explain these differences.

Can J Anaesth. 2008 Jun; 55 Suppl 1: 474373 18753545

Cerebral desaturation during single lung ventilation correlates with postoperative morbidity.

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Introduction: The aim of this project was to determine regional cerebral oxygen saturation (SctO₂) during single-lung ventilation (SLV) and thoracic surgery, assess its correlation with standard monitoring parameters and outcome parameters.

METHODS: Local REB approval was obtained for this study. We used the FORE-SIGHT® (CASMED, USA), a new cerebral oximeter measuring absolute cerebral tissue oxygen saturation in 50 patients undergoing lobectomy, requiring SLV. Left, right and average SctO₂, BIS, peripheral oxygen saturation, mean blood pressure (BP) and heart rate (HR) were recorded every 5 min from induction to extubation. In addition, blood gas analysis were performed every 15 min during SLV. Data were analyzed using SAS software and non-parametric tests (median [interquartiles]). **RESULTS:** Preliminary results from 31 patients are presented. Patients (16 f; 15 m; 64 (57-70) years) had 90 (46 - 134) min of SLV during 130 (80 - 155) min of surgery. The cerebral saturation decreased to a minimum of 62 (56 - 64)% during SLV. No patient presented severe peripheral desaturation; arterial PaO₂ was 163 (105 - 262) mmHg. There was no significant correlation between peripheral oxygen saturation, arterial blood gases changes, or any hemodynamic changes and cerebral oxygen desaturation. There was a positive correlation between the postoperative non-pulmonary organ failures ($P < .02$), the postoperative complications (Clavien; $P < .05$) and the decrease of SctO₂ during SLV.

Discussion: Thoracic surgery with SLV is associated with significant decrease of SctO₂ in the majority of patients despite normal peripheral arterial oxygenation. Perioperative cerebral desaturation is correlated with postoperative complications and non-respiratory organ dysfunction. Further studies are required to assess possible underlying mechanisms. References: none.

http://www.cja-jca.org/cgi/content/abstract/55/suppl_1/474373