intracranial pressure and end-tidal CO_2. Stroke volume variation showed a good ability to predict cardiac output response with an area under the ROC curve of 0.85 with a best cutoff value of 8%. See Figures 1 and 2.
Conclusions Bolus fluid resuscitation resulting in augmentation of cardiac output can improve cerebral oxygenation after severe brain injury.

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Multicentre experience of using ICM+ for investigations of cerebrovascular dynamics with near-infrared spectroscopy

P Smielewski[1], M Czosnyka[1], C Zweifel[1], K Brady[2], C Hogue[2], L Steiner[3], P Hutchinson[1], D Mennon[1], J Pickard[1]
[1]University of Cambridge, UK; [2]Johns Hopkins Hospital, Baltimore, MD, USA; [3]University Hospital, Basel, Switzerland
Critical Care 2010, **14(Suppl 1):**P348 (doi: 10.1186/cc8580)

Introduction ICM+ software encapsulates our 20 years' experience in brain monitoring. It collects data from a variety of bedside monitors and produces time trends of parameters defined using configurable mathematical formulae. To date it is being used in nearly 40 clinical research centres worldwide. We present its application for continuous monitoring of cerebral autoregulation using near-infrared spectroscopy (NIRS).
Methods Data from multiple bedside monitors are processed by ICM+ in real time using a large selection of signal processing methods. These include various time and frequency domain analysis functions as well as fully customisable digital filters. The final results are displayed in a variety of ways including simple time trends, as well as time window based histograms, cross histograms, correlations, and so forth. All this allows complex information from bedside monitors to be summarized in a concise fashion and presented to medical and nursing staff in a simple way that alerts them to the development of various pathological processes.
Results One hundred and fifty patients monitored continuously with NIRS, arterial blood pressure (ABP) and intracranial pressure (ICP), where available, were included in this study. There were 40 severely head-injured adult patients, 27 SAH patients (NCCU, Cambridge); 60 patients undergoing cardiopulmonary bypass (John Hopkins Hospital, Baltimore) and 23 patients with sepsis (University Hospital, Basel). In addition, MCA flow velocity (FV) was monitored intermittently using transcranial Doppler. FV-derived and ICP-derived pressure reactivity indices (PRx, Mx), as well as NIRS-derived reactivity indices (Cox, Tox, Thx) were calculated and showed significant correlation with each other in all cohorts. Error-bar charts showing reactivity index PRx versus CPP (optimal CPP chart) as well as similar curves for NIRS indices versus CPP and ABP were also demonstrated.
Conclusions ICM+ software is proving to be a very useful tool for enhancing the battery of available means for monitoring cerebral vasoreactivity and potentially facilitating autoregulation guided therapy. Complexity of data analysis is also hidden inside loadable profiles, thus allowing investigators to take full advantage of validated protocols including advanced processing formulas.

P349

Cerebral oxygen saturation and cerebral blood flow are relatively stable during single-lung ventilation, if normocapnia is maintained

T Végh, S Szatmári, M Juhász, I László, I Takács, B Fülesdi
University of Debrecen, Hungary
Critical Care 2010, **14(Suppl 1):**P349 (doi: 10.1186/cc8581)

Introduction Previously a report has suggested that administration of a lung-protective strategy for one-lung ventilation (OLV) results in oxygen desaturation of the brain parenchyma. The aim of the present work was to test whether the maintenance of normocapnia during a protective OLV strategy results in alteration of cerebral blood flow and cerebral oxygen saturation.
Methods Data were obtained from 15 patients undergoing thoracic surgery and necessitating OLV of more than 1 hour. Cerebral oxygen saturation (Satcereb) was continuously monitored by the INVOS 5100C Cerebral Oxymeter System along with measurement of cerebral blood flow velocity (MCAV) by transcranial Doppler sonography. Arterial blood samples were taken for blood gas analysis in the awake state, in the supine position after induction during DLV, in the lateral decubitus position during DLV and every 15 minutes during OLV.
Results Satcereb increased significantly when DLV was started with FiO_2 1.0 and remained stable during the course of the study. When ventilation was changed from DLV to OLV, no significant change was observed. A significant decrease of cerebral oxygen saturation was found compared with the value observed during DLV in the lateral decubitus at the time point of 60 minutes after the start of OLV. No significant changes in the MCAV were observed throughout the course of the thoracic surgical procedure.
Conclusions OLV does not result in clinically relevant decreases in cerebral blood flow and cerebral oxygen saturation during application of lung-protective ventilation if normocapnia is maintained.

P350

Factors affecting the transient hyperaemic response test of the cerebral autoregulation

MS Sitina, V Cerny
University Hospital, Hradec Kralove, Czech Republic
Critical Care 2010, **14(Suppl 1):**P350 (doi: 10.1186/cc8582)

Introduction The transient compression of the internal carotid artery (ICA) results in dilatation of cerebral arterioles by effect of autoregulation. In the THR test, the increase in middle cerebral artery (MCA) blood flow immediately after release of transient compression of the ICA is measured, which is proportional to cerebral autoregulation. The aim of the study was to determine the significance of several factors of the test – blood flow inertia (acceleration), dimensions (length and radius) of ICA, patency of the Circle of Willis (WC), and asynchrony between release of ICA compression and arterial pressure pulsations (phase shift).
Methods We constructed a mathematical model of the elements included in the THR test and simulated, using various parameters, blood flow in cerebral vessels and the increase in flow velocity in the MCA after release of ICA compression. We simulated two extreme situations – a perfectly patent (all afferent and efferent arteries meet in one point) and a completely isolated Circle of Willis (ICA bifurcates into only the anterior and middle cerebral arteries). The series of ordinary differential equations describing the THR test was solved by MATLAB R2008a. The solution assumed an absence of autoregulation (effect of studied factors is independent of autoregulation) and the rigidity of all vessels.
Results The effects of acceleration (inertia), dimensions of ICA and patency of WC are negligible. The effect of phase shift (Figure 1) can significantly decrease the immediate post-release MCA flow, which can entirely nullify the increase in post-release MCA flow caused by autoregulation.
Conclusions The effect of phase shift can significantly alter the results of the THR test. For practical purposes we recommend calculation of THR test parameters from the second peak of post-release MCA flow, or using the highest post-release MCA flow from several THR tests.

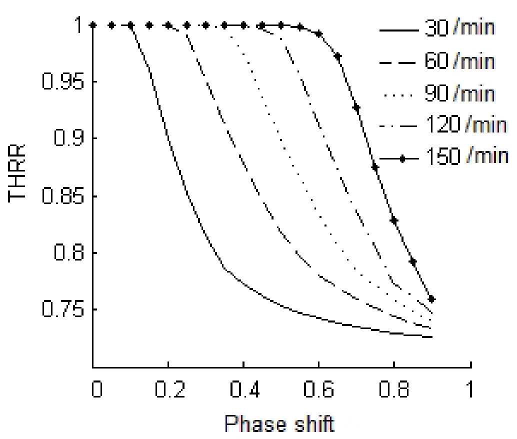

Figure 1 (abstract P350). Dependence of THRR on phase shift.