

evidence on effects of early and delayed cord clamping in preterm infants.

22 TISSUE OXYGENATION IN THE LIGHT OF NON-INVASIVE AND CONTINUOUS NEAR-INFRARED SPECTROSCOPY AND IMAGING (NIRS, NIRI)

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Near-infrared spectrophotometry (NIRS) and imaging (NIRI) are quickly growing optical methods to non-invasively and in vivo study oxygenation of human tissue. NIRS and NIRI are appreciated by patients, relatives e.g. parents, medical personnel and researchers because the methods are harmless, painless, quantitative, bedside applicable, enable continuous measurements (monitoring) and are thus well suited even for fragile and vulnerable intensive care patients.

The presentation will briefly explain the main principles of NIRS and NIRI, including the parameters that can be measured. The relevance of NIRS/NIRI measurements in research and clinics and also potential pitfalls will be discussed.

Then the main applications of NIRS and NIRI in neonatal medicine will be reviewed, e.g. measurements of the brain to avoid hyper- or hypo-oxygenation to safeguard the brain or to study brain activity and function and peripheral measurements, e.g. liver, gut, muscle. The state of these applications and their validity will be addressed.

An increasing number of commercial NIRS instruments is available and an overview will be given.

In an outlook future technical developments, which will enable to non-invasively measure other clinically important parameters such as blood flow, cytochrome oxidase redox state, water and lipids will be presented. Finally, the state of the art in tomographic NIRI with continuously increasing spatial resolution will be presented.

23 UTILITY OF MICROCIRCULATION ANALYSIS IN A PAEDIATRIC ANIMAL MODEL OF HYPOVOLEMIC SHOCK

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Background and aims Evaluation of tisular perfusion is very important in critically ill patients. Several techniques are used to assess tisular blood flow. Most of them are invasive and non accurate. Sidestream dark field imaging is proposed to be a useful non-invasive method to evaluate microcirculation.

Methods Prospective, observational study in 17 two month-old piglets (8.6±1.1kg). Following mechanical ventilation, hypovolemic shock was induced by controlled 30 ml/kg bleed. 5 video sequences were recorded in each pig at basal time, during shock, and after fluid resuscitation using Microscan Microvision® device. Recorded video sequences were analysed later. Microcirculation was assessed determining perfused vessel density (PVD), microvascular flow index (MFI) and heterogeneity index (HI). Automated vascular analysis (AVA®) software was used to analyze the sequences.

Results Before bleed median values for PVD (13.6/mm³ ±2.4) and MFI (2.75±0.22) where higher and HI (0.21±0.14) was lower than during shock (12.4/mm³±1.4, 1.97±0.43 and 0.58±0.36 respectively) (p<0.05). After fluid resuscitation PVD and MFI median values increased (13.69/mm³±1.56 and 2.63±0.26 respectively) and HI decreased (0.32±0.22) (p<0.05).

Conclusions Lower vessel density and slower microvascular blood flow and higher flow heterogeneity occurred during shock. Computerized microcirculation analysis using sidestream dark field was able

to distinguish between basal condition and hypovolemic shock and between hypovolemic shock and after fluid resuscitation.

24 CORRELATION OF MICROCIRCULATION ANALYSIS WITH HEMODYNAMIC AND BIOCHEMICAL PARAMETERS OF TISULAR PERFUSION

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Background and aims Microcirculation assessment focus on 3 components: Vessel density, perfusion, and heterogeneity of microcirculation, measured as perfused vessel density (PVD), microcirculation flow index (MFI), proportion of perfused vessels and heterogeneity index (HI). Correlation of these parameters with hemodynamic and perfusion parameters is not well established.

Methods Prospective, observational study in 17 two-month-old sedated, relaxed and mechanically ventilated piglets (8.6±1.1kg). Video sequences were recorded using Microscan Microvision® device at three different times: before, after induced hypovolemic shock and after fluid resuscitation. 51 sets of measurements where obtained by the analysis of video sequences using automated vascular analysis software. Microcirculation was assessed determining PVD, MFI and HI.

Results PVD showed correlation with MFI (r: 0,589) and central venous oxygen saturation (SvO₂) (r:0,383) and HI (r:-0,600) (all p<0.01). MFI showed correlation with PVD (r:0,589), systolic (r:0,540), diastolic (r:0,443), and median (r:0,517) blood pressure, cardiac index (CI) (r:0,578), SvO₂ (r:0,462), internal carotid artery flow (ICAF) (r:0,623) HI (r:-0,864), lactate blood levels (r:-0,476) (all p<0.01), and intramural gastric pH (r:0,352) (p:0,028).

HI showed correlation with PVD (r:-0,600), MFI (r:-0,864), systolic (r:-0,359) and median (r:-0,350) blood pressure, CI (r:-0,389), arterial pH (r:-0,458), SvO₂ (r:-0,492), ICAF (r:-0,458) (all p<0.01), systemic vascular resistance index (r:0,316) (p:0,027) and diastolic blood pressure (r:-0,291) (p:0,038).

Conclusions Microcirculation parameters (PVD, MFI and IH) were consistent and related to global hemodynamic and tissue perfusion parameters.

25 CAN LOW PERFUSION INDEX PREDICT THE TREATMENT NEED IN PREMATURE INFANTS WITH PATENT DUCTUS ARTERIOSUS?

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Background and aims Perfusion index (PI) shows real time changes in peripheric blood flow. Among critically ill infants, it predicts poor perfusion and the severity of the disease. Early diagnosis and treatment of PDA is important to prevent complications due hemodynamically significant patent ductus arteriosus (PDA). In this study, we aimed to compare the PI values of premature infants with and without hemodynamically significant PDA.

Methods Forty one premature infants were evaluated with echocardiography at the postnatal days 0 and 3. Patients were grouped as: Group 1 (n=19): no - PDA; Group 2 (n=10) hemodynamically nonsignificant PDA; Group 3 (n=12) hemodynamically significant PDA. PI was measured during a quiet state at the postnatal days 0, 1, 2 and 3 by Masimo pulse oximeter. Clinical characteristics of the infants were recorded prospectively.

Results All the study groups were similar with regard to birth weight (1473±51 grams) and gestational age (30±2.9 weeks). Group