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### RESUSCITATION AND PERIVENTRICULAR/ INTRAVENTRICULAR HEMORRHAGE

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**Aim:** The aim of our study was to evaluate the role of resuscitation as the risk factor for periventricular/intraventricular hemorrhage in preterm newborns.

**Methods:** The one year prospective study involved 164 premature newborns, gestational age 23 to 32 weeks, transported from maternity hospital to the Institute for neonatology. According to the development of PVH/IVH three groups were formed. The first group (C- control) was formed of 39 newborns without PVH/IVH, second group (M-mild) involved 88 newborns with mild PVH/IVH and the third group 37 newborns who developed severe PVH/IVH (S- severe). The need for resuscitation was analyzed and compared between the groups, and the relative risk was calculated.

**Results:** The need for resuscitation using positive pressure ventilation (PPV) had 19 (48.7%) newborn from group C, 45 newborns (58.1%) from the group M and the 29 (79,4%) newborns from the group S. The difference was statistically significant,  $P < 0.05$  (0.002). The difference was even more obvious ( $P < 0.001$ ) comparing the use of sodium bicarbonate in resuscitation. As the part of resuscitation  $\text{NaHCO}_3$  received 5 (12.8%) newborns from the group C 8 (9.1%) from the group M and 13 (35.2%) from the group. Calculated relative risk (RR 95% CI) for developing severe form of PVH/IVH was 2.12 (0.97 - 4.62) when PPV is performed and 2.87 (1.69 - 4.88) after the use of  $\text{NaHCO}_3$ .

**Conclusion:** Beside immaturity, the need for resuscitation may represent significant risk factor for the development of PVH/IVH in premature newborns, especially if the  $\text{NaHCO}_3$  was used.

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### BRAIN MONITORING OF NEWBORNS UNDERGOING CARDIAC SURGERY WITH CARDIOPULMONARY BYPASS (CPB)

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**Aim:** To study cerebral electrical activity and local regional oximetry during cardiopulmonary by-pass (CPB) and determine the periods of time in which the brain is at its most vulnerability.

**Setting:** Neonatal intensive care unit of a tertiary university-affiliated children's hospital.

**Methods:** Prospective observational study of newborns with congenital heart disease needing surgical therapy on CPB. Regional cerebral oxymetry (CrSO<sub>2</sub>) with near-infrared spectroscopy (NIRS, INVOS) and amplitude integrated electroencephalography (aEEG, CFM Olympic) were continuously monitored.

**Results:** 23 infants were studied. 19/23 underwent cardiac surgery on CPB with deep hypothermic circulatory arrest (DHCA), 2 had selective cerebral perfusion (SCP), 4/23 did not need circulatory arrest. 70.6% presented critical electric activity during circulatory arrest (aEEG) and a rapid fall in cerebral oxymetry (CrSO<sub>2</sub> < 40%) during CPB-DHCA. The electrical activity ceased when reentering cardiopulmonary bypass. In cases of CPB with SCP there was no critical electrical activity in the aEEG, nonetheless these patients had critical values of CrSO<sub>2</sub> in the postoperative period.

Electrical seizures occurred in 19/23 patients (82.6%). During anesthetic induction 2 patients presented seizures (8.7%), 12 (52.2%) during DHCA, 8 (34.8%) during modified ultrafiltration (MUF), 7 (30.4%) during re-warming and 4 (17.4%) during the postoperative period. Only 4 patients (17.4%) didn't have critical electrical activity at any time

**Conclusions:** Brain activity monitoring with aEEG allows us to identify seizures during CPB, which suggests an inadequate neuro-protection mostly during circulatory arrest.

The combined use of aEEG and INVOS allows a rapid detection of high-risk situations for neurological injury and low cardiac output.