OUTCOME AFTER INFLECTED TRAUMATIC BRAIN INJURY IN SHAKEN BABY SYNDROME: NEUROSURGICAL APPROACH

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Background and Aims Shaken Baby Syndrome (SBS) is a severe form of child abuse caused by violent shaking leading to severe head injuries, causing mild-severe long-term disabilities and death. The study aims to explore medium/long-term consequences of SBS comparing children undergoing neurosurgery with hematoma evacuation/cranioplasty with those with hematoma evacuation or no surgery.

Methods A cohort of 21 children with SBS, admitted to Pediatric Department/Padua Hospital (2003–2011), was followed-up. Each clinical record was reviewed collecting information on onset, acute course, ophthalmologic examinations, neuroimaging, treatment and procedures, family history and social background. Cases were followed-up at 3, 6 and 12 months after trauma, every year. The assessment included fundus evaluation and visual function, neuro-radiological exams (MRI).

Results 21 cases were reviewed (M:F=2:1.1), 12 foreigners, 9 italians. Mean age at onset: 5.7 months (range 1.2–18). Mean age at last follow-up evaluation: 30.4 months (range 5–82). Mean follow-up duration: 24.6 months (range 1–73.5). In acute phase 8/19 underwent neurosurgical intervention and 1/21 underwent eye surgery. 20/21 showed retinal hemorrhages, 21/21 cerebral hemorrhages, 11/21 cerebellar hemorrhages, 5/10 spinal subdural hematoma, 4/21 skull fractures, 6/21 other body region fractures. At last follow-up evaluation resulted: 2/21 hemiplegia, 1/21 paraplegia, 1/21 tetraplegia, 2/21 cortical visual impairment, 3/21 visual field deficits, 4/21 strabismus. 10/21 underwent cognitive and behavioural assessment demonstrating in 6 cases global delay and in 4 cases delay in specific functions (locomotor, eye and hand coordination, performance scale). Surgical procedure’s video will be shown.

Conclusions SBS may influence child development and therapeutic surgical approach seems crucial.

IMPACT OF WARMED INHALED GAS FROM THE MECHANICAL VENTILATOR ON ESOPHAGEAL TEMPERATURE DURING WHOLE BODY HYPOThERMIA FOR HYPOXIC-ISCHEMIC ENCEPHALOPATHY

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During whole body cooling (WBC), the core temperature is monitored with either an esophageal or a rectal probe. Most infants are usually on mechanical ventilation while receiving hypothermia. As the temperature in the esophagus responds rapidly to changes in the ambient temperature, inhalation of warmed gas from ventilator during hypothermia may lead to overestimation of ventilated patients’ actual temperature, causing automated cooling devices to overcool patients well below set temperature targets.

Objective We determined if the esophageal temperature recordings during therapeutic WBC differ between ventilated and non-ventilated infants.

Methods Twenty-two consecutively cooled infants had simultaneous esophageal and rectal temperatures recorded every 4 hours during 72 hours of WBC. The later was deemed to be actual core temperature. Other clinical monitoring and treatment during hypothermia were as per established protocol.

Results Fourteen infants received mechanical ventilation throughout cooling. The remaining 8 infants were on ventilator initially but got extubated and were not on ventilator during 32 to 72 hours section of WBC. Esophageal temperatures were significantly higher than simultaneous rectal temperatures (p<0.01 at each time point) for all 22 infants. However, the esophageal temperatures across every 4 hour time points during 32 to 72 hours section of WBC did not differ between the ventilated (n=14), and non-ventilated (n=8) infants. The magnitude (median, IQR) of the difference between esophageal and rectal temperatures were also similar between the 2 groups.

CONTINUOUS CARBON DIOXIDE MONITORING USING FEATURES OF NEONATAL ELECTROENCEPHALOGRAPHY

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Background and Aims The continuous monitoring of partial pressure of blood carbon dioxide (pCO2) in premature babies has proven to be challenging. Spot measurements of pCO2 can be performed by taking a blood sample. However the frequency of such measurements is limited by their invasiveness.

Aim We aim to develop a continuous non-invasive method of predicting pCO2 using features of the preterm electroencephalography (EEG) signal.

Methods A regression model was trained on eight 12 hour EEG recordings that contained 22 blood gas measurements in total. All measurements were obtained from babies born before 28 weeks gestation and less than 72 hours old. The duration of EEG quiescence
Abstracts

Results  It is shown that by combining the measurements of both a defined period of EEG interburst interval and the relative power of delta EEG frequency band using a multivariate linear regression model, a prediction of pCO₂ can be performed. The automatic removal of mechanical artefact and artefact due to other external influences is demonstrated. A regression coefficient (R²) of 0.64 is obtainable using both the interburst and delta relative power as predictors for pCO₂. All variables are significant to within p<0.05. A section of continuous prediction of pCO₂ using EEG showing correlation with simultaneous transcutaneous carbon dioxide measurement is demonstrated.

Conclusion  The ability to provide a novel non-invasive continuous monitoring of pCO₂ in newborn preterm babies is discussed.

1108  AN EVALUATION OF THE USE OF ENTERAL NUTRITION DURING HYPOTHERMIA TREATMENT FOR PERINATAL HYPOXIC ISCHAEMIC ENCEPHALOPATHY

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Background  There is widespread variation in enteral feeding practices of infants receiving therapeutic hypothermia (cooling) following hypoxic ischaemic encephalopathy (HIE). We compared the safety and efficacy of early versus delayed enteral feeding during cooling.

Methods  Retrospective case control study (January 2009 – December 2011). Cooled infants at Karolinska Hospital, Stockholm (KH) received early enteral feeding and were compared to similar infants at Princess Anne Hospital (PAH) Southampton, who had delayed feeding (controls). Infants also received early parenteral nutrition in both centres.

Results  A complete data set was available for 28/37 infants at PAH compared to 51/51 neonates at KH. Mean baseline parameters at PAH/KH were birth weight (3404.80/3723 g), male/female ratio (50/55 %), umbilical arterial pH (7.1/7.04) and base deficit (15.65/-12.03).

There were differences in enteral feeding rates at PAH/KH (20.1/91.0%). The mean volume of enteral feeds (mls/kg/day) at PAH/KH on days 1-4 were: 0.2/1, 0.2/6.1, 1.8/10.1, 1.9/17.1.

There were also differences (PAH/KH) in mean time to establish full nasogastric tube feeding (5.9/7.2 days) achieving full oral feeds or prolong the length of stay at hospital.

1109  TOTAL BODY HYPOTHERMIA AND CIRCULATING BIOMARKERS OF LIVER FUNCTION

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Background and Aims  Total body hypothermia (cooling) improves outcome in hypoxic-ischaemic encephalopathy (HIE). This study tested the hypothesis that cooling affects the liver by examining whether cooling during HIE was associated with differences in clinically relevant biomarkers of hepatic metabolism.

Methods  Clinical records in 3 centres were searched for babies with HIE and umbilical artery pH at birth ≤ 7.0 born between 01/07/2006 and 30/06/2011. Each centre adopted routine cooling on a different date. The results of blood tests reflecting hepatic metabolism measured according to clinical practice within 7 days of birth were collected. ANOVA was used to assess the associations between extreme values of each analyte, HIE grade and the use of cooling and to calculate estimated marginal means for each condition.

Results  127 babies were identified including 31 with Grade 1 (42% cooled), 65 with Grade 2 (80% cooled) and 31 babies with Grade 3 (90% cooled). Grade of HIE was associated with maximum AST [HIE1: mean 180 (s.e. 120); HIE2: 367 (85); HIE3: 850, (125)], maximum prothrombin time [HIE1: 18 (3); HIE2: 22 (2); HIE3: 36 (4)], maximum bilirubin [HIE1: 117 (9); HIE2: 108 (8); HIE3 68 (15)] and minimum albumin [HIE1: 28.5 (0.9); HIE2: 23.6 (0.7); HIE3: 20.1 (1)] but not with maximum ALT or maximum APTT. Cooling was not associated with any variables.

Discussion  Clinically graded HIE was associated with markers of liver function. Cooling did not modify these associations. Liver and brain may have different susceptibilities to hypoxic-ischaemia or different responses to cooling.