12 AN INVESTIGATION INTO THE COGNITIVE AND NEUROPSYCHOLOGICAL SEQUELAE OF MINOR HEAD INJURY IN CHILDREN – A PROSPECTIVE PILOT STUDY

Jacques Kerr

Objectives Although the majority of head-injured children are Glasgow Coma Scale (GCS) 15 and do not require admission or further investigations there is evidence that some children with a minor head injury (MHI) will go on to experience significant morphological and functional brain deficits. In view of the lack of controlled studies into the sequela e of MHI in children we carried out a pilot study that examined the neuropsychological performance in children who had sustained an MHI.

Methods Children aged 6–12 years who presented to the Emergency Department of the Royal Hospital for Sick Children in Edinburgh with a MHI (GCS 15) were recruited to the study. Neuropsychological assessment was performed using the Cambridge Neuropsychological Test Automated Battery (CANTAB); a computerised battery of tests, which measures motor skills, visual attention, spatial memory, working memory and non-verbal memory span. CANTAB also assesses executive function, which is the highest level of cognitive function that manages planning and allows flexible thought and action.

Results 15 head-injured children were recruited over the study period (eleven boys and four girls). A 2 (subject groups) × 3 (time points) repeated measures Analysis of variance was used on the number of problems solved using the minimum number of computer moves at each time point, which showed a significant interaction (p=0.003). Bonferroni posthoc comparisons demonstrated that in week 1 the head-injured group were significantly lower in performance compared to normative data (p=0.03), but significantly increased in performance between week 1 and 12 months (p=0.0001). The difference in the head-injured group performance between week 1 and week 6 approached significance (p=0.05).

Conclusion The MHI group show a significantly poorer performance with regards to problem-solving in a minimum number of moves, which may indicate impulsive tendencies and insufficient planning ability. Children with a MHI may therefore be at risk of developing problems with high-level cognitive function post-injury.

14 SYSTEMIC INFLAMMATION AT 24 H PREDICTS OUTCOME IN PATIENTS AFTER OUT-OF-HOSPITAL CARDIAC ARREST TREATED WITH THERAPEUTIC HYPOTHERMIA

Gareth Clegg

Introduction Only mild therapeutic hypothermia (MTH) is shown to improve outcome after return of spontaneous circulation, post out of hospital cardiac arrest (OHCA), though its mechanism remains unknown. We hypothesise that the benefit of MTH is mediated through modulation of the inflammatory response.

Methods During our prospective observational study from Aug 2008 to October 2009, 196 OHCA patients were enrolled. 173 were eligible for inclusion; 115 died in Emergency Department (ED), 38 died in intensive care unit (ICU) and 20 survived to discharge. Patients had blood sampled on arrival in the ED and at 24 h, 72 h and 5 days. A small subgroup of patients had blood sampled prehospital during the initial resuscitation phase. Serum levels of cytokines important in the regulation of inflammation (interleukin 6 (IL-6), IL-8, IL-10) were measured along with markers of neutrophil activation (elastase and CD 11b). All patients who reached the ICU had MTH induced and were maintained at 32–34°C for 24 h.

Results Levels of the pro-inflammatory cytokine IL-8 were significantly higher at 24 h after return of spontaneous circulation in patients who died in ICU, compared to those who survived to discharge (478.1 pg/ml (CI 171.1 to 831.1) cf 108.0 pg/ml (CI 44.8 to 171.1) p=0.03). Serum levels of the anti-inflammatory cytokine IL-10 were also much higher in non-survivors (CI 80.9 pg/ml (22.3 to 139.4) cf CI 10.2pg/ml (3.6 to 16.8) p=0.002). IL-10 predicted survival 24 h with an area under the Receiver Operating Characteristic of 0.91 (CI 0.77 to 1.0, p<0.001) and a sensitivity of 100%, specificity 75% at a cut off of 52 pg/ml, LR 4.0. Indicators of neutrophil activation were markedly elevated in all patients on arrival in the ED.

Discussion OHCA is associated with massive systemic inflammation. We have shown that this begins much earlier than previously described, and that levels of both the classically pro-inflammatory and counterregulatory chemokines predict survival. Our findings are consistent with the
hypothesis that MTH works, at least in part, by modulating the inflammation.

**TEMPERATURE POST OUT-OF-HOSPITAL CARDIAC ARREST: THE TOPCAT STUDY**

Richard Lyon

**Introduction**

Out-of-hospital cardiac arrest (OHCA) is a significant cause of death and severe neurological disability. The only postreturn of spontaneous circulation (ROSC) therapy shown to increase survival is mild therapeutic hypothermia (MTH). The relationship between body temperature post OHCA and outcome is still poorly defined.

**Methods**

Prospective observational study of all OHCA patients admitted to a single centre for a 14-month period. Oesophageal temperature was measured in the Emergency Department and Intensive Care Unit (ICU). Select patients had prehospital temperature monitoring.

**Results**

164 OHCA patients were included in the study. 105 (64.0%) were pronounced dead in the Emergency Department. 59 (36.0%) were admitted to ICU for cooling; 40 (24.4%) died in ICU and 19 (11.6%) survived to hospital discharge. Patients who achieved ROSC and had oesophageal temperature measured prehospital (n=29) had a mean prehospital temperature of 33.9°C (95% CI 33.2 to 34.5). All patients arriving in the ED post OHCA had a relatively low oesophageal temperature (34.3°C, 95% CI 34.1 to 34.6). Patients surviving to hospital discharge were warmer on admission to ICU than patients who died in hospital (35.7°C vs 34.3°C, p<0.05). Patients surviving to hospital discharge also took longer to reach target MTH temperature than non-survivors (2 h 48 min vs 1 h 32 min, p<0.05). There was no difference in mean arterial blood pressure on arrival in the ED between survivors and non-survivors.

**Conclusions**

Following OHCA all patients have oesophageal temperatures below normal in the prehospital phase and on arrival in the Emergency Department. This questions the need for prehospital cooling post-OHCA patients. Patients who achieve ROSC following OHCA and survive to hospital discharge are warmer on arrival in ICU and take longer to reach target MTH temperatures compared to patients who die in hospital. The mechanisms of action underlying oesophageal temperature and survival from OHCA remain unclear and further research is warranted to clarify this relationship.