Developmental Outcomes Following Abusive Head Trauma in Infancy: A Systematic Review

BACKGROUND

Abusive head trauma (AHT) • Leading causes of... Severe traumatic brain injury in children less than 1 year of age1 • Death in children less than 2 years of age2 • Few studies examine long-term developmental outcomes of these survivors

Key Questions (KQs) 1. What assessment tools are used to measure developmental outcomes after AHT? 2. What are those outcomes? 3. What factors influence those outcomes? 4. What interventions have been evaluated to influence those outcomes?

RESULTS

Risk of Bias (RoB)

KQ 1 & 2 (N=59, 100%)

KQ 3 (N=42, 71%)

Patient Injury Brain/Head Imaging Deceleration of brain growth Duration of follow-up Medication management (initiation of propranolol and amantadine in 1 patient)

Age Initial Glasgow Coma Scale Initial unresponsiveness/coma Pediatric Trauma Score Severity of symptoms at presentation Cardiopulmonary arrest Apnea Intubation Ventilation Pupillary response Retinal hemorrhage (RH) Bilateral RH with retinal detachment or dense vitreous hemorrhage Dense vitreous hemorrhage Ventricular drain Cerebral perfusion pressure Cerebral autoregulation Blood pressure Seizures Intracranial pressure management

Intracranial hemorrhage (extraxial, intraaxial, parenchymal, subarachnoid) Global ischemia MRR spectroscopy ratio changes Skull fractures Diffuse vs focal hypodensity on CT Basal ganglia (BG) injury Brain injury Diffuse brain edema Transient ischemic attack New focal intracerebral changes from 4 days to 3 months Atrophy General severe white matter decrease Hypoxia / hypoxic ischemic injury Apparent diffusion coefficient (ADC) values in all regions up to 4 days after admission ADC values in BG, thalamus, brainstem, and corpus callosum up to 1 month after injury Hyperperfusion

KO 4 (N=2, 3%)

Salonia et al. 20103 • Methods: RCT, 6 infants with AHT, mild-to-moderate hypothermia (32-33°C) for 48 hours or normothermia • Results: • Significant inverse relationship between endothelin-1 (ET-1) and GOS • No significant difference between ET-1 levels of hypothermia and normothermia groups

Witt et al. 20184 • Method: single-subject interrupted time series without comparison group • Result: improvements in the child’s independent task completion across three functional skills (brushing teeth, writing name, tying shoes), as a function of improvements in the caregiver’s skills.

CONCLUSIONS

• Varied developmental outcome measures • Limited literature - significant methodological issues diminished certainty in evidence quality and precluded synthesis / meta-analyses

IMPLICATIONS

• Improving research methods • Standardization of AHT diagnosis and investigational data (e.g., National Institute of Neurological Disorders and Stroke Common Data Element Project) • Increase prospective and randomized controlled trials to identify outcome predictors and interventions • Guidance from low RoB studies (N=3)3-5

REFERENCES


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