September 22nd, 2023 09:00 - 11:00

PARALLEL SESSION 19 - BRAIN 4

ID 990. CONTEMPORARY PATTERNS OF BRAIN INJURY IN INFANTS WITH NEONATAL ENCEPHALOPATHY IN THE THERAPEUTIC HYPOTHERMIA ERA

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Background:
Brain injury in Neonatal Encephalopathy (NE) has historically been classified into injury to the deep grey matter, white matter/watershed area or global injury.(1) However, injury in other areas have been described.(2,3)
This study aimed to describe contemporary patterns of brain injury in infants with NE in the era of therapeutic hypothermia (TH) and to examine potential risk factors associated with different patterns of injury.

Methods:
Retrospective analysis of all infants with NE admitted for TH to the Brigham and Women's Hospital, a tertiary NICU (January 2016–December 2021). MRIs were performed after rewarming and scored independently by 3 reviewers blinded to

outcome and grade of encephalopathy using the Weeke scoring system.(2) Mann–Whitney U Tests were performed to compare risk factors in infants with and without different patterns of injury.

Results:

Two–hundred and eighty–nine infants with all grades of NE were included with a median gestational age of 39.3weeks (IQR 37.5–40.1) and median birthweight of 3.13kg (IQR 2.72–3.54). Of these, 196 (68%) had abnormal MRI findings. Locations of injury are outlined in Table 1.

Injury to the grey matter was associated with the requirement for extensive resuscitation (chest compressions $p<0.001$, epinephrine $p<0.001$), lower 10–minute Apgar scores ($p=0.003$), worse post–natal gas measurements (pH $p=0.043$, base deficit $p=0.033$, lactate $p=0.031$) and the requirement for inotropes in the NICU ($p=0.013$).

Injury to the white matter was associated with a lower birthweight ($p=0.005$), risk of chorioamnionitis ($p=0.033$), lower umbilical pH values ($p<0.001$), lower 5– and 10–minute Apgar scores ($p=0.021$ and 0.015 respectively) and the requirement for intubation ($p=0.004$).

Infants with grey or white matter injury had a higher clinical ($p=0.003$, $p=0.001$) and EEG grade ($p=0.002$, $p=0.048$) of NE and were more likely to require intubation ($p=0.022$, $p=0.004$). These infants had a higher incidence of seizures ($p<0.001$) and death ($p=0.003$), and had longer hospital stays ($p<0.001$).

Cerebellar injury was associated with vaginal delivery ($p=0.043$) and incidence of PPV ($p=0.043$).

Conclusion:

Areas of brain injury noted in infants with NE extend beyond the hallmark patterns of basal ganglia/thalamus and watershed areas and are associated with different risk factors which may aid in the short–term prediction of outcome.

	n (%)
MRI Findings	
Normal MRI (score of 0)	93 (32)
Abnormal MRI (score of ≥1)	196 (68)
Location of Injury	n (% of those with injury)
Deep Grey Matter	47 (24)
Thalamus	22 (11)
Basal Ganglia	23 (12)
PLIC	22 (11)
Brainstem	6 (3)
Perirolandic Cortex	11 (6)
Hippocampus	7 (4)
White Matter	89 (45)
Cortex	32 (16)
White Matter (not PWML)	47 (24)
PWML	32 (16)
Hemorrhage	26 (13)
Optic Radiation	16 (8)
Corpus Callosum	22 (11)
Cerebellar	34 (17)
Signal abnormalities	12 (6)
Hemorrhage	32 (16)

PLIC, posterior limb of the internal capsule; PWML, punctate white matter lesions

Table 1. Description and location of brain injury noted on MRI scans.

Table 1. Description and location of brain injury noted on MRI scans.

None declared

ID 1029. Persistent alteration of microRNAs in neonatal hypoxic ischaemic encephalopathy (HIE) in the first 6 hours after birth

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Background

HIE remains a serious cause of neurological morbidity in neonates. Initial therapeutic intervention is time sensitive and early diagnosis of HIE remains subjective. We have previously identified miRNAs which are consistently altered in umbilical cord blood and wished to establish if these miRNAs would be detectable and altered on postnatal blood sampling in the first 6 hours after birth.

Methods

Infants with HIE and healthy controls born in Cork University Maternity Hospital (CUMH) from 2018 to 2020 from the Multimodal Assessment of Newborns at Risk of Neonatal Hypoxic Ischaemic Encephalopathy (MONiToR) study. Inclusion criteria for sample selection were term infants born with HIE (and matched controls) in CUMH from 2018 to 2020, who were ⩾ 36 gestational weeks of age. HIE grade (mild, moderate, or severe) was determined based on modified Sarnat score within 6 hours. Whole blood was collected within the first 6 hours (T0) after delivery via Neoteryx dried blood spot microsampling. A custom qPCR panel of 19 candidate miRNAs and

three housekeeping miRNAs for normalisation was analysed in all infants. Benjamini–Hochberg (BH) correction was applied to correct for multiple testing.

Results

In total 41 infants were included in the study (controls, n = 13, and HIE, n = 28 (12 mild, 14 moderate, 2 severe)); and whole blood samples were analysed using in the custom qPCR panel. Comparing infants with mild and moderate HIE at T0 vs control infants at T0, 8 miRNAs were significantly altered after BH adjustment including miR–374a and miR–181b which we have previously validated in cord blood. Subsequently, comparing infants eligible for therapeutic hypothermia (TH) at T0 (moderate and severe HIE) vs infants not eligible for TH at T0 (controls and mild), 2 miRNAs were altered; miR–205 was upregulated (Fold Change = 7, BH adj. P–Value <0.001) and miR–181b was downregulated (Fold Change = –1.5, BH adj.
P–Value <0.001).

Conclusion

Altered miRNA expression persists in the first 6 hours of life and can be detected using a minimally invasive micro–sampling method. These miRNAs should be further explored to identify their potential as bedside biomarkers for rapid detection of hypoxic brain injury.

None declared

ID 1024. Identify correlation between sentinel events and brain lesions in hypoxic-ischaemic encephalopathy (HIE)

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Intorduction:Perinatal asphyxia(PA) is a unpredictable event that can result in post asphyxial encephalopathy. In most cases it is not possible to identify an underlying sentinel event(SE). Outside the presence of SE, the only way to predict aspyxia is abnormalities in the cardiotocographic tracing. Acute damage during PA is associated with typical lesions of the basal ganglia(BG), the thalami(T) and the posterior limbs of the internal capsule(PLIC). However, SE and related brain lesions are rarely investigated together.

Methods:It was a retroprospective study included term newborns with HIE treated with hypothermia(HT). Details regarding the antenatal and perinatal medical history were obtained. Brain lesions were detected such as abnormal signal or diffusion restriction at the first MRI performed 3 to 5 days after HT. They were classificated in typical lesions (T, BG, diffuse BGT + WM, PLIC and perilondic cortex) and atypical (other cortex regions and white matter including minor lesions such as punctate white matter lesions PWML, optic radiation abnormalites). We divided the newborns in: presence(PSE) or absence(ASE) of SE.

Result:78 newborns treated with HT were included. In PSE patients 22/78 (28.2%), more severe umbilical artery pH values (p=0,002) and a pathological CGT 14/22 (63.6% vs 35.7% of ASE group, p=0.03) emerged. MRI brain lesion was present in 26/78 (33.3%) of 11/26 (42.3%) PSE patients. In PSE group MRI lesions (11/22) were significantly more frequent than ASE group 15/56 (50% vs 26.8%, p=0.05 respectively); typical lesions in 8/11 (72.7%) vs 7/15 (46.7%), respectively. In particular, typical thalamic, perirolandic lesions and PLIC alterations (p=0,02; p=0,05; p=0,04, p=0,04 respectively) were present in PSE group. aEEG alterations (48,3%) had a positive correlation for typical MRI lesions at all levels (<0,001) but not for the atypical ones (p=0,2).

Conclusion:The nature of the insult causing typical lesions is consistent with an acute/profound ischaemic insult, highly plausible in case of a SE. Conversely the presence of atypical abnormalities like white matter alterations suggest a more chronic kind of insult to the brain, reinforced by the lack of significant aEEG alterations. Further studies are needed to identify the potential iatrogenic role of HT in case of white matter damage.

None declared

ID 519. Behavior and quality of life in 5-year-old children born very preterm after early high-dose recombinant human erythropoietin. A randomized clinical trial.

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Background

The Swiss Epo Neuroprotection Trial was launched to examine the potential neuroprotective effect of recombinant human erythropoietin (rhEpo) on the neurodevelopment of very preterm newborns. According to the results of the primary and secondary outcome analyses, rhEPO had no effect on the study participants' cognitive abilities, neuro-motor outcomes, or somatic growth at ages 2 and 5 years, respectively. We report here the findings of secondary analyses of pre-specified parent-reported behavioral outcomes of the study children and their health-related quality of life (HRQoL) at age 5 years.

Methods

This randomized, double-blind, placebo-controlled, multicenter trial was conducted in five level-III perinatal centers in Switzerland. Between 2005 and 2012, infants born between 26 weeks 0 days' and 31 weeks 6 days' gestation were recruited. Infants were assigned to receive either rhEpo (3000 IU/kg) or placebo (saline, 0.9%)

intravenously three times during the first 42 hours after birth. Two standardized questionnaires, the Strengths and Difficulties Questionnaire and the Kidscreen–27, were used to evaluate the pre–specified parent–reported measures of behavioral outcomes and health–related quality of life (HRQoL), respectively, of their children at the age of 5 years. The last outcome assessment was completed in 2018.

Results

Among the 448 randomized infants, 228 infants were allocated to the rhEpo group and 220 to the placebo group. Questionnaires data were available for 317 (71%) children at a mean (SD) age of 5.8 (0.4) years [gestational age 29.3 (1.6) weeks at birth; birth weight 1220 (340) grams; 128 (40%) females]. The mean (SD) total difficulties score in the rhEPO group (M = 8.41, SD = 5.60) was similar to that of the placebo group (M = 7.76, SD = 4.81, P = .37).

No evidence for a difference in any other outcome measurements was observed between groups.

Conclusion

The findings of the current secondary outcome analyses provide no evidence in support of a relationship between prophylactic early high–dose rhEpo administration and behavioral outcomes or HRQoL in 5–year–old children born very preterm.

None declared.