14

EEG-DERIVED FUNCTIONAL BRAIN NETWORKS AND COGNITIVE FUNCTION CORRELATES AFTER PERINATAL STROKE

Alja KAVČIČ[1], Assist. Prof. Jure DEMŠAR[2], Assist. Prof. Aneta SOLTIROVSKA ŠALAMON[1]
[1]University Medical Center Ljubljana, [2]Faculty of Computer and Information Science

Introduction: Children after perinatal stroke are permanently affected by cognitive, behavioural and emotional difficulties. EEG functional connectivity estimates of cognitive function are poorly researched in paediatric population. Our aim was to study changes in EEG derived functional brain networks after perinatal stroke and to analyse the correlation of network properties with specific cognitive functions.

Materials and methods: We recorded a 64-channel resting-state EEG, calculated and analysed connectomes of 24 children with a history of perinatal stroke and compared them to the functional connectomes of 24 healthy controls. Age at inclusion was 5-18 years. All participants underwent psychologic evaluation to estimate their cognitive performance and specific deficits. After the data from EEG recordings and psychometric tests were gathered, we compared psychometric test results and graph metric values between the two groups and analyzed the correlation between network characteristics and specific cognitive functions.

Results: The perinatal stroke group had lower intelligence quotient (IQ), slower processing speed, poorer working memory, poorer visual perception, poorer motor coordination and reached higher rates of omissions, commissions, and preservations at the continuous performance test. Functional brain networks after perinatal stroke had lower modularity, higher clustering coefficient, higher interhemispheric strength and higher characteristic path length. The topology of injured networks was more random compared to the connectomes of the control group. Modularity correlated positively with IQ and processing speed, while clustering coefficient correlated negatively with IQ. Graph metrics, indicating network segregation (clustering coefficient and small worldness) correlated positively with higher impulsivity (preservations rate). Impulsivity also correlated positively with graph metrics, reflecting increased functional connectivity (characteristic path length and interhemispheric strength).

Conclusions: Functional brain networks remain disrupted years after perinatal stroke and various graph metrics correlate with specific cognitive deficits. Functional brain networks after perinatal stroke had lower modularity, increased interhemispheric and whole-brain connectivity and their topology shifted toward a random network configuration. Intelligence correlated positively with modularity and negatively with clustering coefficient. Measures reflecting higher network segregation (clustering coefficient and small worldness) and higher connectivity (characteristic path length and interhemispheric strength) correlated positively with impulsivity.

None declared.

16

AUTOSOMAL RECESSIVE HYPEREKPLEXIA: THREE NEONATAL CASES : EACH DEFECT INVOLVING ONE DIFFERENT GENE OF THE DISEASE

Prof. Kamel Monastiri[1], Pr Fatma Zohra Chioukh[1], Dr Maroua El Ouaer[1], Dr Siouar Abdelmoula[1], Dr Manel Bizid[1], Pr Brahim Melaiki Tabarki[2], Dr Hayet Ben Hamida[1]
[1]Centre Maternité et Néonatalogie, Department of NCIU and Neonatology Medicine, Teaching Hospital of Monastir, [2]Department of Pediatrics Prince Sultan Military Medical City,

Background: Hyperekplexia (HPX) is a rare neurogenetic disorder, frequently misdiagnosed in neonates with a risk of apnea, asphyxia, and sudden infant death. Three genes are involved with decreased frequencies, respectively: SLC6A5, GLRB and GLRA1. We describe three term newborns, who presented with apneic access and episodic tonic spasms.

Case Reports:
Patient 1: A baby boy exhibits neonatal generalized-onset seizure, muscular hypotonia and seizures. The parents are consanguineous. He has no affected sibling. Family history for pyridoxine-dependent epilepsy was known in his maternal cousin. Manifestation was neonatal. There was no dysmorphy nor other abnormal clinical features. He was initially suspected to have pyridoxine-dependent epilepsy but symptoms persisted under treatment. Routine and specialized metabolic analyses, as well as MRI with spectrospy were normal. He was being treated by multiple antiepileptic medications for seizure-like episodes (clonazepam, levetiracetam) without success. The infant showed a marked improvement of the startle response and muscle hypertonia with acetazolamide. Exome sequencing showed a homozygous pathogenic variant in the SLC6A5 gene leading to the diagnosis of autosomal recessive HPX type 3. Furthermore, no relevant variant of ALDH7A1 gene related to pyridoxine-dependent was detected.

Patient 2: A baby girl developed early generalized-onset seizure. Parents are consanguineous with a history of suspected HPX in two relatives. She had treatment with clonazepam and acetazolamide. The baby girl did well with marked improvement of her symptoms. She was discharged by the age of 1 month. Exome sequencing showed a mutation (c.84del.) in the GLRB gene.

Patient 3: A baby boy developed at birth, day 1, a neurological distress with generalized hypertonia and excessive startle reflexes. The diagnosis of HPX was suspected and confirmed by Exome sequencing that find a mutation c.881A>G in the GLRA1 gene.
Conclusions: These cases emphasizes the efficiency of Fxome sequencing in the diagnosis of genetic disorders of heterogeneous etiologies and reinforces the fact that HPX can be easily misdiagnosed; The timely diagnosis of HPX will allow families to take adequate preventive measures; moreover, prenatal diagnosis can be provided to families . Acetazolamid seems to be efficient to improuve neurologic manifestations . This needs more study to evaluate.

None declared

17

PROGRESSION OF AMPLITUDE-INTEGRATED ELECTROENCEPHALOGRAPHY AND NEUROLOGICAL OUTCOME IN NEONATES WITH HYPOXIC-ISCHEMIC ENCEPHALOPATHY

Dr. Thu Hua[1], PhD. MD. Tinh Nguyen[2]
[1]Children's Hospital 2, [2]University of Medicine and Pharmacy at HCMC

INTRODUCTION: The characteristics of amplitude-integrated electroencephalography (aEEG) are predictive factors for neurological outcomes in neonates with hypoxic-ischemic encephalopathy (HIE). We investigated the progression of aEEG during hypothermia in order to determine the correlation between aEEG interpretation and early clinical neurological outcomes at hospital discharge.

MATERIAL AND METHODS: A prospective observational study on HIE neonates undergoing hypothermia with aEEG monitoring in Children's Hospital 2, Ho Chi Minh City, Vietnam from June 2022 to June 2023.

RESULTS: 37 HIE neonates underwent hypothermia with improvement in aEEG background activity seen in 28 neonates, of which 18 had background activity returned to a continuous pattern and the median recovery time was 26.5 hours. 5 cases with initial continuous patterns on aEEG had good outcomes at discharge. 8 cases with low voltage or flat trace patterns at any time point had adverse outcomes at discharge ($p = 0.027$). 9 cases with no improvement in pattern had poor outcomes at discharge ($p < 0.001$). Background patterns on aEEG from 48-hour of hypothermia to the end of rewarming were associated with outcome at discharge ($p < 0.05$). Neonates with time-to-normal-trace (TTNT) above the 62-hour cut-off were more likely to have adverse outcomes at discharge, with an AUC of 0.785, sensitivity of 72%, specificity of 83.3%, LR+ of 4.3, and $p = 0.006$. Sleep-wake cycles (SWC) appeared in 14 cases with a median onset time of 34.5 hours. The presence of SWC was related to discharge outcome with $p = 0.002$. Cases with no SWC until the end of hypothermia were more likely to have adverse outcomes at discharge, with an AUC of 0.795, sensitivity of 80%, specificity of 75%, LR+ of 3.2, and $p = 0.004$. Seizure activities on aEEG was present in 26 infants.

CONCLUSIONS: Lack of improvement in background activity, low voltage or flat trace patterns at any time, TTNT of more than 62 hours, and the absence of SWC during hypothermia may serve as predictive factors for poor neurological outcomes in HIE. Further long-term follow-up studies are needed to validate the predictive value of longitudinal analysis aEEG within the HIE population.

Non declared

44

Physiologic and Behavioral Effect of Music Therapy Among Preterm Infants at a Tertiary Level Neonatal Intensive Care Unit in the Philippines: A Phase 1 Randomized Controlled Trial

Dr. Juliene Laurice Ganaden[1], Dr. Navid Roodaki
[1]Ilocos Training And Regional Medical Center

BACKGROUND AND OBJECTIVE: Prematurity is a global problem accounting for 28% of neonatal mortality. Preterm infants stay in the NICU are exposed to inevitable noises which can have deleterious effects. Research such as this, focuses on non-invasive methods that could be used as an adjunct in the management of infants which includes the use of music.

METHODS: This is a single-blind randomized controlled trial done in a Level III Neonatal Intensive Care Unit (NICU) in the Philippines. Newborn (<36 weeks) were randomly allocated to intervention (lullaby group) or control group. Lullaby music was played inside the incubator at a volume of 50-60 dB in the experimental group. No music played in the control group. Physiologic parameters were recorded including heart rate, respiratory rate, oxygen saturation, temperature and behavior states before, during and after the intervention. Inflammatory markers
such as C-reactive protein and Procalcitonin were measured on days 1,3 and 5 of life.

RESULTS: Total of 72 preterm infants equally divided into 2 groups were included with no drop out. Significant difference was noted on the cardiac rate and respiratory rate on day 2 ($p = <0.001$), and in the CRP and Procalcitonin level of the control group and treatment group ($p = <0.001$) on day 3 and 5.

CONCLUSION: This study demonstrated the effects of Music therapy in the heart rate and respiratory rate. Furthermore, it also showed the potential effects of music in the inflammatory markers (procalcitonin and CRP) and Behavioral response of preterm infants.
None declared

124

NEURODEVELOPMENTAL OUTCOMES IN VERY LOW BIRTH WEIGHT PRE-TERM INFANTS: ASSESSING THE INFLUENCE OF PERINATAL RISK FACTORS

Dr. Mariana Pereira[1], Dr. Maria Ramos[1], Dr. Ana Feio[2], Dr. Mário Ribeiro[1], Dr. Filipa Raposo[1], Dr. Clara Machado[1], Dr. Sandra Costa[1]
[1]Hospital de Braga, [2]Centro Hospitalar do Médio Ave

INTRODUCTION

Advancements in perinatal healthcare have led to notable improvements in survival rates of premature infants, but similar progress in reducing neonatal morbidity, particularly neurodevelopmental issues, remains elusive.

MATERIAL AND METHODS

Observational study conducted on infants born between 2016-2020 with gestational age (GA)<32w and/or birth weight (BW)<1500g. Deaths and children who were either lost to follow-up or lacked follow-up records at this hospital were excluded. Moderate/severe sequelae included cerebral palsy, motor impairments, global developmental quotient(GDQ)<70, and sensorineural deafness. Neurodevelopmental assessment was conducted at 30 months using the Ruth-Griffiths Mental Development Scale. Analyzing associations, the Mann-Whitney test, Chi-square or Fisher's exact test were used. Logistic regression was employed to predict moderate/severe sequelae. Statistical analysis was conducted using SPSS®($p<0.05$).

RESULTS

A total of 133 children were included, with a median GA of 29.9(IQR 3.4) weeks and BW of 1230(IQR 475)g. Median age at assessment was 35(IQR 10) months. Median GDQ was 94(IQR 14), with language/hearing and eye-hand coordination subscales scoring lowest, with median DQs of 88(IQR 21) and 89(IQR 16), respectively. Moderate/severe sequelae were observed in 8(6%) patients: cerebral palsy in 2(1.5%), hemiparesis in 2(1.5%), sensorineural deafness in 3(2.3%), and GDQ<70 in 3(2.3%).

Patients with sequelae exhibited lower GA (29.1[IQR 1.8] vs. 29.9[IQR 3.6] weeks) and BW (1205[IQR 592] vs. 1230[IQR 475]g) compared to the non-sequelae group. Half of the parents had low educational levels (50% vs. 26.4% in mothers; 50% vs. 15.2% in fathers). The majority had pregnancy complications (87.5% vs. 61.6%), with cesarean section as the primary delivery mode (75% vs. 69.6%), and 37.5% multiple pregnancies (vs. 33.6%). All infants required non-invasive ventilatory support (vs. 88%), with 50% requiring invasive ventilation (vs. 28.8%). Additionally, 25% presented with early-onset sepsis/meningitis (vs. 20.8%), 37.5% with late-onset sepsis/meningitis (vs. 21.6%), 37.5% with necrotizing enterocolitis(NEC) (vs. 6.4%), 25% with severe peri-intraventricular hemorrhage (PIVH) (vs. 3.2%), and 25% with periventricular leukomalacia (vs. 13.6%). NEC ($p=0.019$) and severe PIVH ($p=0.044$) were significantly higher in patients with sequelae, along with hospitalization duration ($p=0.032$), with no other statistically significant findings.

CONCLUSIONS

These findings emphasize the significance of implementing neuroprotective strategies and continuous long-term monitoring to enable timely intervention.

None declared

170

AIMING TO A BETTER AND PROLONGED CONTROL OF GLUCOSE VARIABILITY (GV) IN PRETERM BABIES < 31 WKS THANKS TO CONTINUOUS GLUCOSE MONITORING (CGM)

Marcella Battaglini[1, 2], Giorgia Brigati[2], Irene Bonato[1, 2], Andrea Calandrino[1, 2], Samuele Caruggi, Alessandro Parodi[1, 2], Diego Minghetti[2], Sara Mangini[2], Professor Luca Ramenghi[1, 2]
[1]Department of Neuroscience, Ophthalmology, Genetics and Mother-Child Sciences (DINOGMI), University of Genoa, Italy, [2]IRCCS Istituto Giannina Gaslini, Genoa, Italy

BACKGROUND Hypoglycaemia (< 47 mg/dl) is known to alter neurological outcome. Hyperglycaemia (> 180 mg/dl) and high GV studied with Mean Amplitude of Glycaemic Excursions (MAGE) are also potential problems.
Objective: to evaluate CGM role in addition to pioneer studies to achieve a better glucose control (1,2).

MATERIALS AND METHODS Infants GA (26+0 - 31+0 wks) and BW > 700 g were enrolled. Newborn were randomly assigned into a real time group (RTG, with overt lecture of the continuous glucose data) and a control blind group (CBG). CGM was firstly maintained for six days and further repeated for six further days at the 32nd week of postmenstrual age. CBG babies wore the CGM device with blinded monitor and silent alarms, with routine intermittent blood glucose control only, therefore glucose rate administration was modified according to intermittent blood glucose or CGM respectively in the two groups.

RESULTS 53 patient's (CGM 26, CBG 27) were recruited.
In the RTG glucose administration was modified more often than in the CBG group (median 3.5/24h vs 1.2/24h - p value 0.042). Hypoglycaemia and Hypoglycaemia > 60 minutes episodes were more frequent in the BCG group (p value 0.0001, p value 0.042). MAGE was more stable in RTG, more interestingly, MAGE studied at 32nd week of postmenstrual age also confirmed more stable values (Table 1)

CONCLUSIONS CGM can reduce hypoglycaemia and long-lasting hypoglycaemia episodes, allowing a more tailored adjustment of glucose administration. Even more interesting, the reduced glucose variability obtained in the first week was maintained exclusively in the RTG at 32 wks of postmenstrual age suggesting the importance of the early adjustment of glucose administration.
1) Galderisi, A. et al. Continuous Glucose Monitoring in Very Preterm Infants: A Randomized Controlled Trial. http://pediatrics.aappublications.org/.

2) Beardsall K et al. REACT collaborative. Real-time continuous glucose monitoring in preterm infants (REACT): an international, open-label, randomised controlled trial. Lancet Child Adolesc Health. 2021 Apr;5(4):265-273. doi: 10.1016/S2352-4642(20)30367-9. Epub 2021 Feb 10. PMID: 33577770; PMCID: PMC7970623.

	Real time group (RTG) n=26	control group (CBG) n=27	p value
Gestational age, weeks	29.34 ± 1.47	28.82 ± 1.39	0.19
Birthweight, g	1289.23 ± 276.27	1217.41 ± 258.02	0.26
Number of detections of hypoglycaemia (< 47 mg/dl)	339 (0.7%)	934 (1.8%)	0.0001
Number of detections of hyperglycaemia (> 180 mg/dl)	145 (0.3%)	830 (1.6%)	0.0001
Number of detections of hypoglycaemia (< 47 mg/dl) on 32nd week of postmestrual age	260 (1.19%)	785 (2.9%)	0.0001
Number of detections of hyperglycaemia (> 180 mg/dl) on 32nd week of postmestrual age	1 (0.005%)	38 (0.14%)	0.0001
Episodes of Hypoglicaemia	73	151	0.042
Episodes of Hypoglicaemia > 60 minutes	5	28	
Day 1 (MAGE)	5.87 ± 8.57 (mg/dl)	16.87 ± 9.16 (mg/dl)	0.002
Day 2 (MAGE)	5.20 ± 6.04 (mg/dl)	20.00 ± 17.00 (mg/dl)	≤ 0.001
Day 3 (MAGE)	3.98 ± 5.09 (mg/dl)	16.21 ± 12.40 (mg/dl)	< 0.001
Day 4 (MAGE)	6.87 ± 6.95 (mg/dl)	11.60 ± 9.89 (mg/dl)	0.10
Day 5 (MAGE)	7.59 ± 6.58 (mg/dl)	14.99 ± 5.73 (mg/dl)	< 0.001
Day 6 (MAGE)	10.02 ± 6.14 (mg/dl)	18.34 ± 7.78 (mg/dl)	0.005
32nd week of postmestrual age (MAGE)	14.88 ± 4.75 (mg/dl)	19.41 ± 8.39 (mg/dl)	0.01