September 22nd, 2023 08:00 - 09:00

POSTER WALK – BRAIN 3

ID 672. Correlation of Therapeutic Hypothermia for HIE and Pulmonary Hypertension

Doctor Rashida Javed[1], Doctor Harsha Gowda[1]

[1]Birmingham Heartlands Hospital, Uk, Birmingham, United Kingdom

Background and Aim

Neonates with perinatal asphyxia and moderate to severe Hypoxic Ischemic Encephalopathy(HIE) are currently treated with Therapeutic Hypothermia(TH) as a part of brain protective strategy. Perinatal asphyxia is a risk factor for development of Persistent Pulmonary Hypertension(PPHN). In animal studies, hypothermia was associated with an increase in pulmonary vascular resistance(PVR). One degree drop in temperature can increase PVR by 1–2%. It was suggested that increasing oxygen requirement during TH is probably attributable to PPHN and may have serious clinical consequences.

The aim of this study is to evaluate any correlation of therapeutic hypothermia and development of pulmonary hypertension.

Method

Retrospective study of all infants who underwent TH for moderate to severe HIE over a period of 3 years(Jan 2020—Dec 2022). Data was collected from Badger(Electronic Patient Record). The diagnosis of PPHN was based on clinical signs (pre and post ductal saturation difference >10%, high oxygen requirement) and/or Echocardiography findings of raised pulmonary pressures. Correlation of TH and PPHN was determined. Ventilation days and length of hospital stay was recorded.

Treatment with inhaled nitric oxide(iNO) and inotropes was assessed. Outcome was measured in terms of MRI brain severity and feeding method at discharge.

Result

Total 60 neonates were included in the study who were treated with TH for HIE. 17% were diagnosed with PPHN. 60% developed moderate PPHN and 20% had mild PPHN. All were successfully treated for PPHN. Correlation of TH causing PPHN was found in 60% whereas, 40% who developed PPHN did not had association with TH. Only 50% required Nitric oxide for PPHN management. Table1

Conclusion

In this small cohort of infants who underwent TH for HIE, 10% developed PPHN after initiation of TH. Clinicians treating these infants need to be aware of this potential complication when providing TH for HIE. Neonates with lower Apgar score are more prone to develop PPHN while undergoing TH. These infants need longer ventilation days and length of hospital stay.

No difference in immediate outcomes like MRI brain changes and feeding at discharge are observed.

Large multicentral studies are urgently required to establish this association to provide robust evidence.

Table 1: Comparison of Neonates who developed PPHN vs No PPHN while undergoing Therapeutic Hypothermia for HIE

	TH with PPHN (n=10)	**TH without PPHN (n=50)**
Gestational age (mean ± SD)	39.5 ± 2.1	38.3 ± 1.5
Birth weight, kg (mean ± SD)	3.5 ± 0.98	3.2 ± 0.6
APGAR at 5 min (mean ± SD)	2.7 ± 2.3	3.8 ± 2.7
Inotropes needed (%)	100%	40%
Inhaled Nitric Oxide (%)	50%	0
Ventilation days (mean ± SD)	5.7 ± 1.3	2.8 ± 1.7
Length of hospital stay (mean ± SD)	14 ± 10	12 ± 13.2
Outcome		
MRI findings:		
1. Mild HIE (%)	20%	16%
2. Moderate HIE (%)	10%	28%
3. Severe HIE (%)	30%	22%
4. Normal MRI (%)	30%	34%
Bottle/breastfeeding at discharge (%)	60%	68%
Nasogastric feeding at discharge (%)	30%	24%
Deceased	1	4

None declared

ID 846. NEONATAL PERFORATOR STROKE (PS): A POSTNATAL MORE THAN A PERINATAL ORIGIN IN PRETERM BABIES?

Doctor Gaia Cipresso[1,2], Doctor Paolo Massirio[1,2], Doctor Samuele Caruggi[1,2], Doctor Francesca Buffelli[2,4], Doctor Alessandro Parodi[1,2], Doctor Ezio Fulcheri[2,4], Doctor Domenico Tortora[3], Doctor Diego Minghetti[1], Doctor Mariasavina Severino[3], Doctor Andrea Rossi[2,3], Doctor Luca Antonio Ramenghi[1,2]

[1]Neonatal Intensive Care Unit, Department Mother And Child, Irccs Istituto Giannina Gaslini, Genoa, Italy, [2]Department of Neurosciences, Rehabilitation, Ophthalmology, Genetics, Maternal and Child Health (DINOGMI), University of Genoa, Genoa, Italy, [3]Neuroradiology Unit, Department Mother and Child, IRCCS Istituto Giannina Gaslini, Genoa, Italy, [4]Anatomical Pathology Unit, IRCCS Istituto Giannina Gaslini, Genoa, Italy

BACKGROUND: Perforator stroke (PS) is a subtype of perinatal arterial ischaemic stroke (PAIS), it involves small branches of middle cerebral artery and may affect important brain structures and functions. In literature very few studies of PAIS have focused on characteristics and risk factors of PS subgroup. We report our single center experience, updating previously reported results.

METHODS: We retrospectively collected data of patients who underwent brain MRI from March 2012 to March 2022. We analyzed perinatal and postnatal features of patients with perforator stroke focusing on timing of diagnosis.

RESULTS: Out of 1927 patients we found PAIS in 49 (16 preterm and 12 with asphyxia). PS was present in 20 cases (40,8% of PAIS; incidence 1 %), 8 of them (40%) were VLBW preterm
(61% in preterm with PAIS) and 12 were term babies (7 asphyxia, 1 hypoglycemia, 4 seizures).

PS was identified in 9 babies with ultrasound (7 were preterm babies, mean age 32 days, range 7–60 days) and with MRI in the others.
Placenta data were available in 7 patients and all resulted abnormal with only 2 “malperfusion”.
Sepsis was diagnosed before PS in 25% patients, all preterm.

CONCLUSION: PS represents the most common form of PAIS in preterm babies and it is frequent in babies suffering asphyxia (58%). In preterm babies ultrasound has a good sensitivity to diagnose PS (87,5%). In all preterm babies diagnosis followed previous negative ultrasound. Placental malperfusion that suggests a thromboembolic origin of PAIS seems to be pretty rare in our population. These data suggests a postnatal development of PS in premature babies more than a perinatal one.

None declared

ID 380. LEVETIRACETAM AS FIRST-LINE TREATMENT FOR NEONATAL SEIZURES IN THE HYPOXIC-ISCHEMIC ENCEPHALOPATHY CONTEXT: AN OPTIMAL DOSE FINDING STUDY (LEVNEONAT-1)

Professor Geraldine Favrais[1], Dr Moreno Ursino[2], Dr Emilie Bourel[3], Dr Julie Léger[4], Dr Florence Flamein[5], Dr Alexandra Chadie[6], Pr Pierre-Louis Léger[7], Dr Isabelle Guellec[7], Dr Mouchel- La Fosse Catherine[8], Pr Vincent Jullien[9], Dr Sarah Zohar[2]
[1]Department of Neonatology, CHU de CAEN NORMANDIE, Normandie Univ, UNICAEN, INSERM UMR-S U1237, Physiopathology and Imaging of Neurological Disorders (PhIND), GIP Cyceron, Institut Blood and Brain @ Caen-Normandie (BB@C), CAEN , FRANCE , [2]INSERM, Centre de Recherche des Cordeliers, Sorbonne Université, Université Paris Cité, HeKA, Inria Paris, PARIS , FRANCE, [3]INSERM UMR 1105, Research Group on Multimodal Analysis of Brain Function, Pediatric Neurophysiology Unit, University of Picardie Jules Verne, AMIENS, FRANCE, [4]CIC INSERM 1415, CHRU de Tours, TOURS, FRANCE, [5]Department of Neonatology, Pôle Femme-Mère-Nouveau-Né, Hôpital Jeanne de Flandre, Centre Hospitalier Universitaire de Lille, LILLE, FRANCE, [6]Department of Neonatal Pediatrics, Intensive Care, and Neuropediatrics, Rouen University Hospital, Rouen, France , ROUEN, FRANCE, [7]Neonatal and pediatric intensive care, Trousseau Hospital, assistance publique des Hôpitaux de Paris, PARIS, FRANCE, [8]Pharmacology department, CIC (Center of Clinical Investigation) 1414, Rennes University Hospital , RENNES, FRANCE, [9]INSERM UMR 1137, Infection Antimicrobials Modelling Evolution (IAME), Université Paris 13, PARIS, FRANCE

Background
Phenobarbital remains the first-line treatment for neonatal seizures despite a inconstant efficacy and a plausible neurotoxicity. In this prospect, novel antiepileptic drugs, like levetiracetam (LEV), are considered. The principal aim of this study was to

determine the optimal LEV schedule in terms of efficacy and tolerance as first-line treatment for neonatal seizures in infants with hypoxic-ischemic encephalopathy.

Methods

This phase II study involved four centres. Eligible patients exhibited a gestational age ⩾ 36 weeks, a birth weight ⩾ 1800 g, a neonatal encephalopathy in a birth asphyxia context, electrical seizures before the postnatal day 3, a standard electroencephalographic monitoring and no previous treatment with an antiepileptic drug. Inclusion required the informed consent of both parents. LEV schedule included a loading dose (LD) and subsequent 8 maintenance doses (equal to ¼ LD) every 8 hours for a 3-day treatment. Four LD were tested: i) 30 mg/kg, ii) 40 mg/kg, iii) 50 mg/kg, and iv) 60 mg/kg. Efficacy was stated when electric discharges were reduced by 80% during the 4-hour period after the LD. Side-effects were analysed within the 30 days following LD. Dose allocations were determined taking into account the efficacy and tolerance data of the previous participants via a Bayesian design developed to determine the most appropriate schedule which induced efficacy in at least 60% of cases with side-effects in less than 10% of cases. In parallel, blood samples were collected at five time-points for the LEV pharmacokinetic analysis.

Results

From February 2018 to March 2022, 16 infants were recruited. Two infants were treated at the first level, four at the second level and nine at the third level. The first infant treated with the 60 mg/kg LD exhibited a severe hyponatremia that contraindicated this dose level for further participants. Efficacy criteria were fulfilled for 5 infants out of 14 participants. Eleven patients were subsequently treated with phenobarbital. The pharmacokinetic analysis are in progress.

Conclusion

Our study can not support the use of levetiracetam as first-line treatment for neonatal seizure.

Ethics: CPP-Ouest-1 (2016-R25 MINEURS), ANSM 160652A-31

Funding: Grant from GIRCI Grand-Ouest (PHRI13-GF/LEVNEONAT-1)

EudraCT 2014-000791-26, NCT 02229123

None declared

ID 997. MULTI-MODAL MONITORING OF INFANTS WITH HYPOXIC-ISCHAEMIC ENCEPHALOPATHY WITHIN 12-HOURS OF BIRTH AND PREDICTION OF OUTCOME

Doctor Aisling Garvey[1,2], Prof Brian Walsh[1,2], Dr Sean Mathieson[1], Dr Michael Moore[3], Dr John O'Toole[1,2], Dr Vicki Livingstone[1,2], Dr Andreea Pavel[1,2], Dr Daragh Finn[1,2], Prof Geraldine Boylan[1,2], Prof Deirdre Murray[1,2], Prof Eugene Dempsey[1,2]
[1]Infant Research Centre, Cork, Ireland, [2]Department of Paediatrics and Child Health, University College Cork, Cork, Ireland, [3]Department of Radiology, Cork University Hospital, Cork, Ireland

Background:
Hypoxic–ischaemic encephalopathy (HIE) carries a significant risk of brain injury and adverse neurodevelopmental outcome.(1, 2) Early identification of at–risk infants is critical to optimise intervention. We aimed to investigate the ability of currently available bedside monitoring techniques to predict short–term MRI and long–term neurodevelopmental outcome in infants with HIE.

Methods:
Prospective observational study conducted in a tertiary NICU, Ireland. Infants with all grades of HIE had continuous electroencephalography (EEG), non–invasive cardiac output monitoring (NICOM) and near–infrared spectroscopy (NIRS) commenced within the first 6 hours of admission to the NICU. One–hour epochs of time–synchronised data were selected at 6 and 12 hours.
Abnormal short–term outcome was defined as an abnormal MRI (Barkovich scoring) and/or death in the first week after birth.

Abnormal long–term outcome was defined as a score of <1SD below the mean in any of the developmental domains of the Bayley's Developmental Assessment at approximately 2 years of age or death of the infant.

Results:
Fifty–seven infants with HIE were included (27 mild, 24 moderate, 6 severe). Median gestational age was 39.9 weeks (IQR 38.1—40.7) and birthweight was 3.4 kgs (IQR 3.0–3.7). Three infants died in the first week and neurodevelopmental outcome was available in 42 infants at a median age of 25 months (IQR 23–26) . At 6 hours, quantitative EEG features of relative spectral power and spectral difference at the higher frequency bands were significantly associated with abnormal long–term outcome: AUC 0.83, 95%CI 0.66–0.99 and AUC 0.78, 95%CI 0.55–1.00 respectively (Table 1). At 12 hours, quantitative EEG features of spectral power significantly predicted abnormal short–term outcome (AUC 0.68, 95%CI 0.53–0.84). Quantitative EEG features of spectral power and cerebral oxygenation (cSO2) significantly predicted long–term outcome: AUC 0.75, 95%CI 0.57–0.93 and AUC 0.73, 95%CI 0.55–0.90 respectively. Combining different modalities did not improve prediction. NICOM measurements were not helpful in identifying infants with abnormal outcome at either time point.

Conclusion:
EEG remains the best individual predictor of outcome in infants with HIE. Quantitative EEG features at 6 and 12 hours successively predicted both short– and long–term outcome in infants with HIE.

		n (normal/abnormal)	Normal Outcome	Abnormal Outcome	p-value	AUC	95% CI	n (normal/abnormal)	Normal Outcome	Abnormal Outcome	p-value	AUC	95% CI
		6 hours						12 hours					
Barkovich Scoring +/- Death													
NIRS	cSO_2	33 (21/12)	76.5 (66.5 - 85.0)	78.0 (72.3 - 81.4)	0.754	0.54	0.34-0.73	55 (38/17)	80.5 (74.5 - 88.3)	80.0 (76.0 - 85.0)	0.682	0.54	0.38-0.69
	FTOE	26 (16/10)	0.19 (0.13 - 0.30)	0.21 (0.16 - 0.28)	0.623	0.56	0.34-0.79	46 (32/14)	0.15 (0.09 - 0.25)	0.17 (0.11 - 0.24)	0.599	0.55	0.38-0.72
NICOM	CO	13 (7/6)	70.3 (64.9 - 84.4)	87.3 (71.1 - 98.8)	0.138	0.76	0.50-1.00	22 (14/8)	74.9 (66.8 - 86.6)	82.3 (60.2 - 95.9)	0.868	0.53	0.25-0.81
	HR	13 (7/6)	127 (89 - 140)	127 (116 - 133)	0.836	0.54	0.20-0.87	22 (14/8)	125 (102 - 133)	126 (108 - 141)	0.57	0.58	0.32-0.83
	SV	13 (7/6)	0.63 (0.46 - 0.85)	0.73 (0.58 - 0.77)	0.836	0.55	0.22-0.88	22 (14/8)	0.64 (0.56 - 0.72)	0.57 (0.52 - 0.79)	0.616	0.57	0.30-0.85
EEG	Spectral Power FB1	34 (22/12)	175.4 (81.3 - 279.0)	133.6 (82.9 - 334.3)	0.709	0.54	0.33-0.75	56 (38/18)	210.8 (91.4 - 282.8)	85.2 (36.4 - 263.9)	**0.046**	0.67	0.50-0.83
	Spectral Power FB2	34 (22/12)	12.0 (7.1 - 15.8)	8.8 (5.5 - 16.5)	0.606	0.56	0.35-0.77	56 (38/18)	11.4 (6.5 - 15.4)	8.5 (3.0 - 14.0)	0.065	0.65	0.49-0.81
	Spectral Power FB3	34 (22/12)	5.3 (3.7 - 8.0)	4.9 (3.6 - 8.9)	0.901	0.52	0.30-0.73	56 (38/18)	5.7 (4.4 - 7.0)	4.2 (1.8 - 6.9)	0.15	0.62	0.45-0.79
	Spectral Power FB4	34 (22/12)	3.1 (2.5 - 5.7)	3.6 (1.7 - 5.0)	0.873	0.52	0.31-0.73	56 (38/18)	3.7 (2.3 - 6.5)	2.3 (0.8 - 4.1)	**0.028**	0.68	0.53-0.84
Qualitative EEG Grade		34 (22/12)	1.0 (0.8 - 3.0)	1.0 (1.0 - 2.8)	0.817	0.53	0.32-0.73	56 (38/18)	1.0 (1.0 – 2.0)	1.5 (1.0 – 2.5)	0.062	0.64	0.48-0.81
Abnormal 2 year outcome +/- Death													
NIRS	cSO_2	27 (20/7)	79 (68-85)	78 (71-81)	0.725	0.55	0.30-0.80	43 (34/9)	85 (76-89)	78 (65-84)	**0.039**	0.73	0.55-0.90
	FTOE	21 (16/5)	0.21 (0.14-0.29)	0.17 (0.11-0.22)	0.445	0.63	0.37-0.88	37 (30/7)	0.16 (0.09-0.23)	0.20 (0.14-0.26)	0.312	0.63	0.40-0.85
NICOM	CO	13 (9/4)	75.6 (68.8-94.7)	75.3 (65.2-91.7)	0.71	0.58	0.23-0.95	18 (14/4)	78.5 (69.5-89.5)	65.1 (58.1-85.1)	0.158	0.75	0.42-1.0
	HR	13 (9/4)	127 (109-135)	119 (94-139)	0.94	0.51	0.13-0.90	18 (14/4)	127 (120-134)	118 (90-145)	0.878	0.54	0.12-0.95
	SV	13 (9/4)	0.70 (0.57-0.78)	0.68 (0.51-0.83)	1	0.53	0.16-0.90	18 (14/4)	0.63 (0.54-0.78)	0.59 (0.47-0.71)	0.505	0.63	0.30-0.95
EEG	Spectral Power FB1	26 (20/6)	166.4 (84.7-334.3)	175.4 (108.4-279.0)	1	0.50	0.27-0.74	44 (34/10)	198.2 (86.6-269.4)	81.4 (42.1-243.6)	0.096	0.68	0.48-0.88
	Spectral Power FB2	26 (20/6)	10.6 (6.2-16.3)	12.5 (11.2-14.5)	0.457	0.61	0.39-0.83	44 (34/10)	11.2 (6.5-14.8)	8.6 (1.8-12.6)	0.206	0.64	0.42-0.85
	Spectral Power FB3	26 (20/6)	4.9 (3.6-8.1)	5.3 (4.2-5.6)	0.929	0.52	0.30-0.73	44 (34/10)	5.6 (3.7-7.1)	3.9 (1.2-5.9)	0.058	0.70	0.51-0.89
	Spectral Power FB4	26 (20/6)	3.4 (2.6-5.0)	2.8 (1.5-3.1)	0.054	0.77	0.58-0.95	44 (34/10)	3.5 (2.2-6.4)	1.7 (0.6-3.6)	**0.016**	0.75	0.57-0.93
	Relative Spectral Power FB1	26 (20/6)	0.89 (0.85-0.91)	0.89 (0.87-0.93)	0.573	0.58	0.32-0.85	44 (34/10)	0.89 (0.85-0.92)	0.90 (0.83-0.91)	0.649	0.55	0.35-0.75
	Relative Spectral Power FB2	26 (20/6)	0.053 (0.042-0.070)	0.060 (0.043-0.082)	0.533	0.59	0.32-0.86	44 (34/10)	0.059 (0.042-0.073)	0.059 (0.047-0.097)	0.553	0.57	0.36-0.77
	Relative Spectral Power FB3	26 (20/6)	0.030 (0.024-0.038)	0.028 (0.021-0.037)	0.614	0.56	0.31-0.84	44 (34/10)	0.029 (0.023-0.040)	0.026 (0.023-0.043)	0.815	0.52	0.30-0.75
	Relative Spectral Power FB4	26 (20/6)	0.018 (0.015-0.028)	0.014 (0.010-0.016)	**0.016**	0.83	0.66-0.99	44 (34/10)	0.017 (0.015-0.026)	0.018 (0.012-0.023)	0.447	0.58	0.35-0.82
	Spectral Difference FB1	26 (20/6)	0.015 (0.013-0.018)	0.013 (0.011-0.018)	0.614	0.58	0.31-0.84	44 (34/10)	0.015 (0.013-0.017)	0.014 (0.012-0.016)	0.354	0.6	0.40-0.80
	Spectral Difference FB2	26 (20/6)	0.043 (0.034-0.047)	0.041 (0.028-0.044)	0.219	0.68	0.44-0.91	44 (34/10)	0.042 (0.037-0.045)	0.038 (0.031-0.044)	0.075	0.69	0.49-0.88
	Spectral Difference FB3	26 (20/6)	0.033 (0.030-0.037)	0.028 (0.020-0.033)	**0.046**	0.78	0.55-1.00	44 (34/10)	0.033 (0.029-0.038)	0.030 (0.023-0.034)	0.08	0.69	0.48-0.89
	Spectral Difference FB4	26 (20/6)	0.016 (0.014-0.020)	0.014 (0.009-0.017)	0.123	0.72	0.46-0.97	44 (34/10)	0.016 (0.014-0.019)	0.016 (0.012-0.017)	0.481	0.58	0.37-0.79
Qualitative EEG Grade		26 (20/6)	1 (1-2)	1 (0-3)	0.386	0.60	0.30-0.91	44 (34/10)	1 (1-2)	2 (1-3)	0.354	0.60	0.37-0.83

cSO_2, cerebral oxygenation; FTOE, fractional tissue oxygen extraction; CO, cardiac output; HR, heart rate; SV, stroke volume; FB, frequency band.
p-values derived from Mann-Whitney U test. Values in bold indicate p<0.05.

Table 1. NIRS, NICOM and EEG variables at 6 and 12 hours of age and their association with Short–term MRI and Long–term Neurodevelopmental Outcome

Table 1. NIRS, NICOM and EEG variables at 6 and 12 hours of age and their association with Short–term MRI and Long–term Neurodevelopmental Outcome

None declared

ID 614. EARLY HYPEROXIA AND 2-YEAR OUTCOMES IN INFANTS WITH HYPOXIC-ISCHAEMIC ENCEPHALOPATHY- A SECONDARY ANALYSIS OF THE INFANT COOLING EVALUATION TRIAL

Doctor Shiraz Badurdeen[1], Prof Jeanie Cheong, A/Prof Susan Donath, Prof Stuart Hooper, Prof Graeme Polglase, A/Prof Sue Jacobs, Prof Peter Davis

[1]Department of Paediatrics, Mercy Hospital for Women, Melbourne, Australia

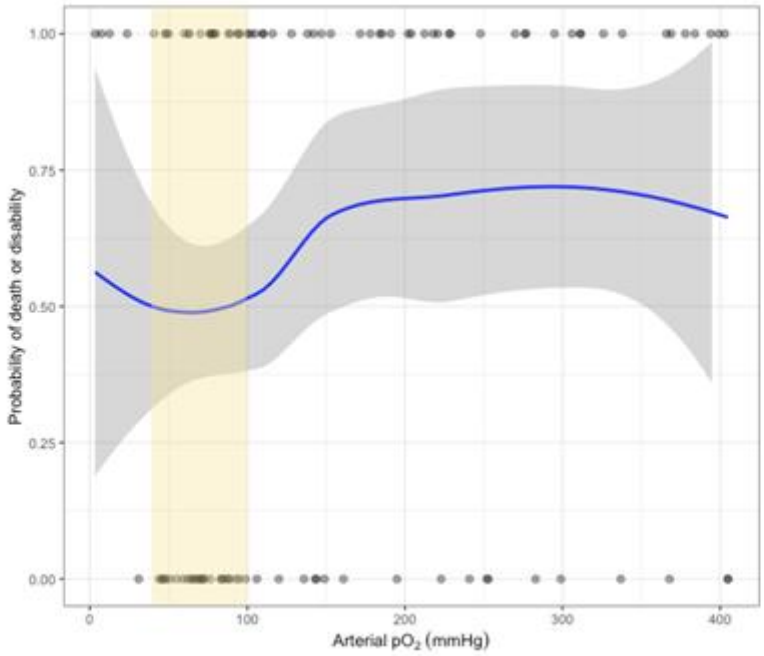
Background: It is unknown whether exposure to hyperoxia in the first few hours after peripartum hypoxic–ischaemia exacerbates brain injury. We investigated whether hyperoxia on admission is causally associated with death or disability in infants with hypoxic–ischaemic encephalopathy.

Methods: We analysed data from the Infant Cooling Evaluation (ICE) trial that enrolled newborns ⩾35 weeks' gestation with peripartum hypoxic–ischemia and moderate–severe encephalopathy. Infants were randomly allocated to hypothermia or normothermia and the primary outcome was death or major sensorineural disability at 2 years. We included infants from both randomised arms who had an arterial pO2 measured within 2 h of age. Using a directed acyclic graph (DAG), we established that markers of severity of perinatal hypoxia–ischaemia at birth (pH, 10–minute Apgar score, need for adrenaline, and time to first breath) and arterial pCO2 were a minimally sufficient set of variables for adjustment in a binomial logistic regression model to estimate the causal relationship between arterial pO2 and death/disability. Given the non–linear univariable relationship between arterial pO2 and the study outcome, we grouped infants depending on whether they were normoxic (40–99 mmHg) or hyperoxic (100–500 mmHg).

Results: Among 208 infants with available primary outcome data, 116 (56%) had an arterial pO2 within 2h of birth. The unadjusted analysis showed a U–shaped

relationship between arterial pO2 and death/disability, with normoxic infants (40–99 mmHg) at lowest risk (Figure). In the adjusted model, hyperoxia (pO2 100—500 mmHg) was found to increase the risk of death or disability in comparison to normoxia (adjusted risk ratio 1.62, 95% confidence interval 1.08 — 2.01, p= 0.03).

Conclusions: Early hyperoxia was causally associated with death/disability among infants who had an arterial blood gas on admission in the ICE trial. Limitations include the possibility of residual confounding and other causal biases. Further work is warranted to confirm this relationship in the era of routine therapeutic hypothermia and improved titration of supplemental oxygen. If confirmed, our findings could open a novel therapeutic avenue for infants with HIE.



Unadjusted probability (+/– 95% confidence interval) of death or disability versus admission arterial pO2. The yellow area highlights the normoxic range. Dots represent individual infants (n=111) excluding extreme outliers (n=5).

Unadjusted probability (+/– 95% confidence interval) of death or disability versus admission arterial pO2. The yellow area highlights the normoxic range. Dots represent individual infants (n=111) excluding extreme outliers (n=5).

None declared

ID 1046. TRANSCUTANEOUS CARBON DIOXIDE MONITORING IN NEONATES RECEIVING THERAPEUTIC HYPOTHERMIA FOR NEONATAL ENCEPHALOPATHY

Doctor Eniko Szakmar[1,2], John Sunwoo[3], Sara Cherkerzian[2], Doctor Seh Hyun Kim[2], Katie Hannon[2], Chelsea Munster[2], Doctor Aisling Garvey[2,4], Hoda Elshibiny[2], Sarah Lee[2], Danielle Ben-Davis[2], Maria Angela Franceschini[3], Jill Robertson[2], Doctor Helen Christou[2], Doctor Terrie Inder[5], Doctor Mohamed El-Dib[2]

[1]Division Of Neonatology, Department Of Pediatrics, Semmelweis University, Budapest, Hungary, [2]Department of Pediatrics, Brigham and Women's Hospital, Harvard Medical School, Boston, United States of America , [3]Athinoula A. Martinos Center for Biomedical Imaging, Massachusetts General Hospital, Harvard Medical School, Boston, United States of America , [4]INFANT Research Centre; Department of Paediatrics and Child Health, University College Cork, Cork, Ireland , [5]Department of Pediatrics, Children's Hospital of Orange County, University of California , ,

Background: Hypocapnia is associated with brain injury and adverse neurodevelopmental outcomes in infants treated with therapeutic hypothermia (TH) for neonatal encephalopathy (NE). Transcutaneous measurement of CO2 (tcPCO2) has been widely adopted in neonatal intensive care to continuously monitor PCO2 levels. However, its accuracy has not been evaluated in neonates under TH. Thus, we aimed to assess the reliability of tcPCO2 readings and to compare changes in tcPCO2 levels during TH between infants with and without brain injury on MRI.

Methods: This prospective observational trial enrolled infants, who received TH for mild to severe NE between 2019 and 2022 at Brigham and Women's Hospital. Temperature-corrected PCO2 values from venous, arterial and capillary samples were analyzed. The tcPCO2 data was captured by a real-time integrated

neuromonitoring system. Bland– Altman plot was used to analyze the agreement between PCO2 and tcPCO2 values. We identified 2 groups of patients with and without any brain injury based on the assessment of MRI after rewarming. The association between brain injury and tcPCO2 changes over time was analyzed using linear mixed models with fixed effects for group, phase, and their interaction and adjustment for correlation among repeated measurements (Figure 1).

Results: 87 corresponding tcPCO2 and PCO2 data points from 31 enrolled patients were analyzed by Bland– Altman plot that revealed a bias (±SD) of 5.2 (11.0) with limits of agreement of –16.3 and 26.6 mmHg. 63% of the blood gases were of venous origin. The difference between PCO2 and tcPCO2 was ⩽ 10 mmHg in 79.3% (69/87) of samples.
Sixteen (51.6%) infants had evidence of any brain injury on MRI. Results from mixed models indicated a significant effect of time on tcPCO2 level (F =4.4, p= 0.001), but no difference by brain injury status (F= 0.0, p=0.304) or an interaction effect (F=1.2, p=0.304) (Figure 1).

Conclusions: Our results support the feasibility and utility of tcPCO2 in infants receiving TH. Longitudinal analysis revealed that trajectories of tcPCO2 did not differ between infants with and without brain injury. These pilot results need to be interpreted cautiously; increasing sample size and further investigations are needed.

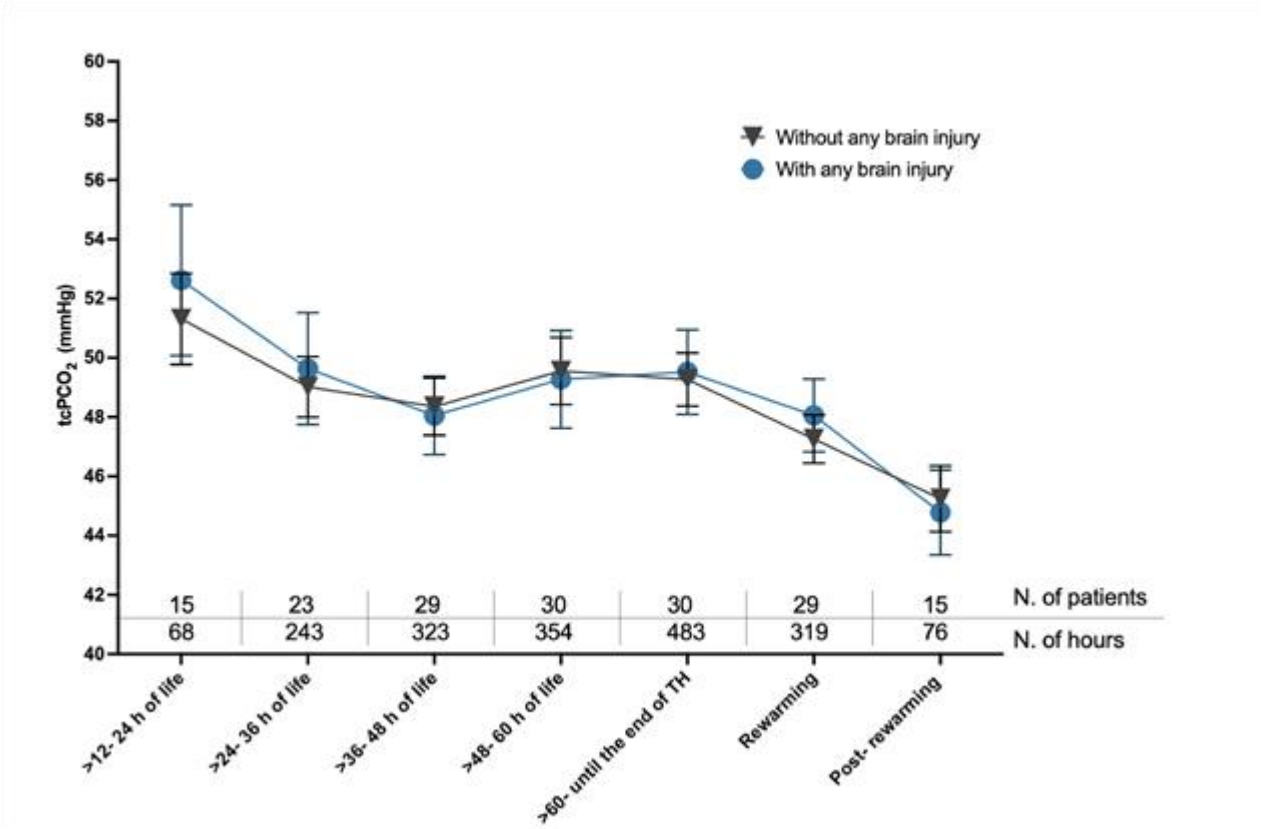


Figure 1: Trajectories of tcPCO2 (estimated marginal means ± standard error) over study phases in infants with and without any brain injury on post rewarming MRI.

Figure 1: Trajectories of tcPCO2 (estimated marginal means ± standard error) over study phases in infants with and without any brain injury on post rewarming MRI.

None declared

ID 566. A National Perspective on Neonatal Therapeutic Hypothermia in Ireland: Time to Achieving the Optimal Temperature

Doctor Aoife Flynn[1,5], Ms Julie McGinley[2], Ms Indra Campillo[3], Doctor Peter Filan[4], Prof John F Murphy[5]

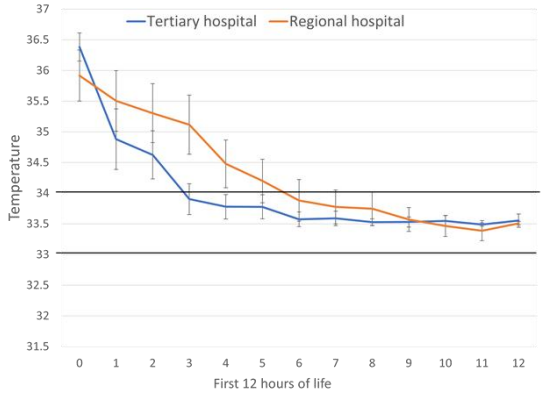
[1]Children's Health Ireland , Dublin, Ireland, [2]National Women and Infants Health Programme, Dublin, Ireland, [3]National Perinatal Epidemiology Centre, Cork, Ireland, [4]Cork University Maternity Hospital, Cork, Ireland, [5]National Maternity Hospital , Holles Street, Dublin, Ireland

Background: Therapeutic Hypothermia (TH) was rolled out as a national initiative in Ireland in 2009.To obtain the maximum benefit from TH, the cooling process must be commenced by 6 hours of age.Target temperature is 33–34C, maintained for 72 hours, followed by gradual rewarming over 12 hours. In Ireland, there are 19 maternity units/hospitals nationally, but just four tertiary/referral centres. Peripheral centres may initiate passive cooling, while active cooling is provided only in tertiary centres. This study was mounted to determine whether there were differences between infants born in tertiary NICUs and regional units in reaching this target temperature range.

Methods: Data on TH cooling patterns for infants born in the tertiary NICUs and peripheral units was obtained from the 2019 & 2020 Neonatal Therapeutic Hypothermia National reports. We determined what proportion achieved the target temperature at 6 hours, comparing mean temperature at every hour for first 12 hours, confidence intervals and p values.

Results: In 2019–2020, 147 infants received TH nationally: 98 TH infants were born in the 4 tertiary centres, 49 TH infants were born across the other 15 regional units. The proportion of the TH infants reaching the target temperature by 6 hours in Tertiary NICUs was 92/98 (94%) vs. in Regional units was 36/49 (73%) P<0.01.

Conclusion: A greater proportion of infants born in the tertiary centres achieved the optimal temperature at 6 hours of age compared with the TH infants born in the peripheral/regional units. In tertiary NICUs, the TH infants receive active cooling from the start. Infants in the regional units receive passive cooling at the start, with active cooling usually initiated on transfer to a tertiary centre, by the National Neonatal Transport Team. The findings would suggest that it would be preferable to commence active cooling from the start in the peripheral units. We, therefore, suggest the idea of the rolling out of active TH to other sites, in regional units around the country, on a phased basis initially in centres with access to resources, training for staff and where there is a Consultant Neonatology presence. This will inform future National Policy.



Infant core temperature for the first twelve hours of life in 2019–2020

Infant core temperature for the first twelve hours of life in 2019–2020

None Declared

ID 54. Early catch-up in growth and psychomotor development of preterm infants in low-income country

Professor Gloire Mbayabo[1]
[1]University Hospitals of Kinshasa , Kinshasa, Congo (the Democratic Republic of the)

Background. Prematurity remains a real public health concern in the world, especially in low–income country like the Democratic Republic of Congo (DRC), and it leads to growth retardation and psychomotor developmental deficits.
This study aims to determine the period of catch–up in growth and psychomotor development in preterm infants in low–income country in order to improve their outcome.

Methods. We followed 65 preterm infants from April 2016 to March 2017 admitted in three hospitals of Kinshasa, the capital of Democratic Republic of Congo (DRC), from the birth till 6months postnatal corrected age. These three hospitals have the same standard of the management of preterm infants. They underwent Kangaroo mother care (KMC) and classic method (incubators). We determined the catch–up at 6 months postnatal corrected age in growth and psychomotor development. Psychomotor development was assessed using Bayley scale II.

Results. Among 65 preterm infants included in this study, 31 underwent KMC and 34 underwent classic method; 26 (40%) were male and 39(60%) were female. At 6months postnatal corrected age, 44 (67.7%) vs 21(32.3%) caught up in weight, 42(64.6%) vs 23(35.4%) caught up in height; 32(49,2%) vs 33(58.2%) caught up in mental development age and 44(67.7%) vs 21(32.3%) caught up in motor developmental age. The majority of preterm infants who caught up in growth and psychomotor developmental had birth age >32 weeks, birth weight >1500g.

Conclusion. The early catch–up in growth and psychomotor development is effective in preterm infants even in low–income country. This catch–up phenomenon is mostly influenced by birth age and weight.

Keywords: Preterm infants, catch–up, growth, psychomotor development, DR Congo
No conflict of interest

ID 979. THE ONSET AND TIMING OF MENTAL, BEHAVIOURAL AND NEURODEVELOPMENTAL DISORDERS, AND DISEASES OF THE NERVOUS SYSTEM IN RELATION TO SUB-CATEGORIES OF PREMATURITY FROM BIRTH TILL THE ADOLESCENCE (RETROSPECTIVE LONGITUDINAL STUDY)

Mrs Ruta Morkuniene[1], Mr Vilmantas Gegzna[2], Prof Janina Tutkuviene[1]

[1]Department of Anatomy, Histology and Anthropology, Institute of Biomedical Sciences, Faculty of Medicine, Vilnius University, M.K. Ciurlionio str. 21 , Vilnius, Lithuania, [2]Institute of Biosciences, Life Sciences Centre, Vilnius University, Sauletekio av. 7, Vilnius, Lithuania

Background: Some of the most common problems in premature children are mental, behavioural, and neurodevelopmental disorders and diseases of the nervous system. Lacking studies analysing the onset and timing of aforementioned health problems, the aim of this study was to analyse the peculiarities in morbidity and timing of neurodevelopmental and nervous system diseases in preterm children with respect to their gestational age (GA) and birth weight (BW) from birth to adulthood.

Methods: A retrospective longitudinal study of 423 preterm Lithuanian children included the incidence and timing of the mental, behavioural and neurodevelopmental disorders (MBND), and diseases of the nervous system diagnosed according to the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD–10) in relation to GA and BW. Kruskal–Wallis followed by post–hoc Conover—Iman's tests were applied for comparison of nonparametric data.

Results: 1. According to GA, moderate to late preterm newborns formed the major part (N=356, 84.2%) of the study sample in comparison to extremely and very preterm newborns (N=67, 15.8%). According to BW, the largest was low (1500–2500

g) BW group (49,2%), while extremely (<1000 g) and very low (1000–1500g) BW group accounted for 11,4%, suboptimal (2500–3000 g) – 29,6%, and normal (3000–4000 g) BW group – 9,2%. Overall, total diagnoses through 18 ICD–10 chapters from birth till adulthood accounted for 1552 cases, of which the first MBND comprised 7.9% (n=122), and diseases of the nervous system – 3.4% (n=52). The first disease of the nervous system more frequently manifested in early than in late childhood (0–3 years–73%/3–18 years:26.9%). However, MBND were more frequently newly diagnosed in late childhood (0–3 years–26.2%/3–18 years –73.8%). Very preterm newborns close to two times earlier ($p<0.01$) developed their first MBND [M(SD)=2.84(1.7) years] than late preterm newborns [M(SD)=4.92(2.45) years]. Analysis of the most common ICD–10 diagnoses will be provided.

Conclusions: More than a tenth of diagnoses were related to physiological or functional disorders of the nervous system. Diseases of the nervous system are more likely to be detected in early childhood, while diagnoses of MBND were delayed to late childhood with manifestation time depending on the severity of prematurity.

None declared

ID 323. Temperature control during therapeutic hypothermia in neonatal transport

Doctor Rachel Morris[1,2], Miss Alex Harris[1], Doctor Rosemarie Boland[1,3], A/Prof Michael Stewart[1,3,4]

[1]Paediatric Infant Perinatal Emergency Retrieval, Royal Children's Hospital, Melbourne, Australia , [2]Singleton Hospital, Swansea , United Kingdom, [3]Murdoch Children's Research Institute, Melbourne, Australia, [4]Department of Paediatrics, University of Melbourne, Melbourne, Australia

Background: Neonates with hypoxic–ischaemic encephalopathy (HIE) are commonly outborn and require retrieval. Transfer to a tertiary centre with timely establishment of therapeutic hypothermia (TH) within six hours of birth is critical to reduce the risk of mortality and morbidity in those with moderate to severe HIE. Only one of six neonatal retrieval services across Australia has implemented servo–controlled cooling. The Paediatric Infant Perinatal Emergency Retrieval (PIPER) service in Victoria, Australia, currently use refrigerated gel packs to provide TH. This study aimed to evaluate the efficacy of this method prior to consideration of implementing servo–controlled cooling.

Methods: A retrospective cohort study of infants who received whole body cooling during transport by PIPER between 1st January 2015 and 31st December 2020. Infants were excluded if they had a known major congenital anomaly, were not transferred and/or palliated in referral centre, or were rewarmed during transfer due to clinical instability. Transport records were reviewed via the hospital electronic medical records; ‘EPIC’ and entered into REDCap for review and analysis.

Results: A total of 202 infants were included. Median (IQR) gestation at birth was 39 (37–40) weeks, with a median (IQR) birth weight of 3300 (2994–3655) grams. Transfer occurred by road (86%), fixed wing (10%) and rotary wing aircraft (4%). Overall, 136 infants (67%) reached target temperature (33–34 C) whilst under the care of PIPER, at a median (IQR) time of 3.7 hours (2.98–5.18). Of the 136 infants who reached target temperature, 51 (38%) were maintained in therapeutic range. Infants were cooled actively with refrigerated gel packs (59%), passively cooled (40%), unknown (1%). On arrival at the receiving centres, 51% of infants were in therapeutic target range, median (IQR) temperature 33.9^{0}C (33.4–34.5). Median (IQR) age at arrival from birth to treating centre was 5.7 hours (4.77–7.01).

Conclusion: Achieving and maintaining TH in the transport setting remains a significant clinical challenge. Target temperature was not maintained in most infants in this study. These findings suggest an urgent need for evaluation of a potentially more efficacious cooling method such as servo–controlled therapeutic hypothermia in our retrieval setting.

None declared

ID 973. Aluminum neurotoxicity: behavioral and biochemical study after treatment with caffeic acid

Miss Zehor Chouari[1], Miss Khadidja Kessas[1], Miss Wafaa Lounis[1], Professor Omar Kharoubi[1]

[1]University Oran1 ABB, laboratory of Biotoxicology experimentale, Biodepollution and Phytoremediation, Faculty of Life an, Oran, Algeria

Humans and animals interact daily with their environment and are exposed to a wide range of chemicals and heavy metals. Aluminum; The third most abundant metallic element in the earth's crust; is the cause of considerable metabolic and functional dysfunctions in humans and animals. It acts on very specific structures of the central nervous system (the hippocampus, prefrontal cortex and cerebellum) which alters them by inducing oxidative stress by modifying the various synaptic transmission systems and cellular function. In order to treat the deleterious effects of this metal on the central nervous system, the effect of caffeic acid was tested in male rats of the Wistar strain previously poisoned with aluminum chloride. An intraperitoneal injection of Al, at a weekly dose of 60mg/Kg was administered to the animals and a treatment of 30mg/Kg/day of caffeic acid was administered by gavage, for 6 weeks. Aluminum exposure caused intense changes over time in body and brain weight and developed neurobehavioral deficits, through increased locomotor activity, anxiety and a depressive state with significant inhibition of acetylcholinesterase activity. However, treatment with caffeic acid resulted in an improvement in depression, anxiety and locomotor activity. The results show that this bioactive compound increased AchE activity. The results of the present study suggest that Caffeic Acid can prevent the neurodegenerative changes induced by Aluminum.

Keywords: Aluminum, Caffeic acid, neurobehavioral deficits

none declared

ID 404. POSTNATAL MANAGEMENT OF MYELOMENINGOCELE:THE NIGUARDA HOSPITAL EXPERIENCE

Doctor Roberta Restelli[1]
[1]Asst Grande Ospedale Metropolitano Niguarda, Corbetta, Italy

Postnatal management of myelomeningocele: the Niguarda Hospital experience

Roberta Restelli, Marina Casartelli, Ottavio Vitelli, Marco Fossati, Silvia Oliveri, Stefano Martinelli
Neonatal Intensive Care Unit, ASST Grande Ospedale Metropolitano Niguarda, Milan, Italy

Background: Myelomeningocele (MMC) is the most common form of spina bifida, with a lifelong impact on the quality of life for infants born with this condition. In this study, the authors aimed to provide an overview of the current management and outcomes for infants with MMC managed at their institution. This can provide a center–specific historical cohort for comparison with MMC cases treated in the future.

Methods: This is a retrospective, single–institution cohort study including all consecutive MMC cases between January 1, 2007, and June 1, 2022, at ASST Grande Ospedale Metropolitano Niguarda in Milan. Outcome data included closure of the defect (location, timing, and surgical parameters), hydrocephalus management, Chiari malformation type II (CMTII) management.

Results: A total of 68 patients were included with predominantly lumbosacral lesions (33/68). All cases were diagnosed antenatally; no patient was treated antenatally with fetal surgery. Cesarean section was the preferred way of delivery in 62/68 patients. Hydrocephalus and Chiari malformation type II were the most frequent associated conditions present in 47/68 cases. Postnatal repair was performed within

48h after birth in all cases. In 11/68 cases a concomitant plastic surgery was necessary to close the breach. Hydrocephalus developed in 43/68 cases after MMC repair with a 63.2% ventriculoperitoneal shunt intervention rate after on average 13 days. The mean hospitalization time was 43 days. Posterior fossa decompression surgery for the treatment of CMTII was performed in 3/68 patients.

Conclusions: This study provides an overview of current MMC management at the authors' center and will serve as a historical cohort for comparison with future surgery cases operated at the center in the coming years optimizing outcomes and decreasing downstream complications. Apart from a relatively lower ventriculoperitoneal shunt intervention rate, the authors' outcome data are comparable to those in the literature.

none declared