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Abstracts

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ABS 1

CRITICAL CONDITION OF THE FETUS: RISK FACTORS AND PERINATAL OUTCOMES

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INTRODUCTION

A reason for the growth of adverse birth outcomes for term infants with normal body weight, and possibly in other cases, is the untimely, unhelpful diagnosis of life-threatening and critical conditions of the fetus during pregnancy and childbirth.

METHODS

In order to identify risk factors for the development of the critical state of the fetus, we studied 32 pregnant patients in whom the critical condition of the fetus was found as zero or reversible flow in the umbilical artery and the absence of diastolic flow component in the aorta of the fetus. Assessment involved ultrasound, Doppler study of feto-placental parameters. The average age of women was 31.7 years; nulliparous – 66.7%, multipara – 33.3%. All women had somatic diseases: kidney diseases – 16.7%, chronic hypertension – 50%, endocrine diseases in 33.3%, obesity – 35.4%.

RESULTS

Of the women studied, 66.7% had complicated obstetric and gynecological history: miscarriages – 56.3%, infertility – 50% (of which the primary – 62.5%), pregnancy was the result of the assisted reproductive technology (ART) – 33.3% of women. All patients were diagnosed with preeclampsia: moderate – 66.7%, severe – 33.3%. Critical condition of the fetus was diagnosed for the first time from 28 to 30 weeks in 54.2%, from 30 to 32 in 16.7%, from 32 to 34 in 20.8% of cases. The critical state of the fetus was combined with fetal growth restriction (FGR) in 75% of cases, while 25% of cases showed normal parameters of growth of the fetus. All patients (100%) with critical state of fetus delivered by caesarian section: from 28 to 30 weeks in 54.2%, 30-32 weeks in 16.7%, 32-34 weeks in 20.8% of women. The average weight of the newborns was 1,253 g, average height 37.7 cm, average Apgar scores at 1 min 5.7, at 5 minutes 6.7. All infants (100%) required intensive care unit after birth for treatment of respiratory distress syndrome and prematurity.

CONCLUSIONS

A leading role in the development of the critical state of the fetus is played by primary infertility, pregnancy after *in vitro* fertilization (IVF) and preeclampsia. The critical state of the fetus is often associated with FGR, but it can possibly occur with normal parameters of growth. The critical condition of the fetus is associated with a high frequency of preterm births for perinatal indications with gestational age from 28 to 34 weeks.

ABS 2

A MID-STUDY SAFETY CONTROL IN A HYPOTHERMIA PLUS MELATONIN CLINICAL TRIAL

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INTRODUCTION

To date, moderate hypothermia treatment is the only useful neuroprotective intervention to reduce or avoid long-term neurodevelopment sequelae. Specific drugs in addition to hypothermia are being investigated to increase neuroprotection (hypothermia plus).

METHODS

Randomized clinical trial; 2 branches of intervention: 1 (experimental): 5 mg/kg every 24 h iv (3 doses) starting before the first 6 hours of life; and 2 (placebo). From December 2014 to June 2015, 13 asphyxiated neonates were enrolled at Granada and Almeria hospitals (Spain) according to internationally accepted hypothermia criteria. 8 received melatonin and 5 were placebo-treated. Blood samples were collected at different times: T1 (admission), T2 (after 24 h) and T3 (after rewarming). Hemoglobin, hematocrit, total leukocyte count, platelet count, serum sodium, serum potassium, serum calcium, maximum lactate, urea, creatinine, ALT and plasma direct bilirubin were determined. Friedman test was used separately for both interventions. If statistical significance was found, we used Wilcoxon test.

RESULTS
Serum sodium of patients treated with melatonin significantly increased towards normalization from T1 to T3, and from T2 to T3. Serum sodium of patients treated with placebo trends towards pathologically low levels. No significant differences were observed in the following parameters: blood platelet counts, potassium, maximum lactate, urea, creatinine, ALT or direct bilirubin. Considering lactate, the trend was towards normal values in melatonin group vs clearly pathological values in placebo group during the study period. In the liver analysis, ALT became abnormal upper levels in placebo group.
CONCLUSIONS
Melatonin added to hypothermia treatment is a safe intervention without clinical, biological or biochemical adverse events. Serum lactate and sodium returned to normal levels from birth to third day in melatonin group, clearly indicating benefits in melatonin-treated newborns.

ABS 3

EARLY PREDICTORS OF NEURODEVELOPMENTAL OUTCOME IN ASPHYXIATED INFANTS TREATED WITH SELECTIVE HEAD COOLING

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INTRODUCTION
Therapeutic hypothermia is now the standard therapy for neonatal hypoxic-ischemic encephalopathy (HIE) after perinatal asphyxia, and most of the published predictors for neurodevelopmental outcome were evaluated after whole body cooling. The reported evidence about selective head cooling (SHC) is limited.
METHODS
We conducted a retrospective cohort study in asphyxiated term infants treated with SHC therapy from August 2011 to June 2015. The cases who didn't complete 72 hours SHC therapy or were lost to follow were excluded. All cases were monitored with Amplitude-integrated electroencephalography (aEEG) during therapy. Transcranial ultrasonography was checked before and after cooling, and brain magnetic resonance imaging (MRI) was performed 7-10 days after birth. Neurodevelopmental outcome was evaluated by Bayley Scales of Infant Development, third edition (BSID-III) at 12 or 24 months of age. Poor outcome was defined as deceased, cerebral palsy and/or epilepsy, or abnormal Bayley III assessment. Data was compared between groups by Fisher exact test (categorical variables) or Mann-Whitney test (nominal variables).
RESULTS
A total of 29 infants were included and 17 of them were defined as poor outcome. Compared to favorable outcome group, the infants with poor outcome had more seizures (88.2% vs 33.3%, p = 0.005) and hyperglycemia (52.9% vs 9.1%, p = 0.041) before SHC. There was no difference in the initial finding of cranial ultrasonography and aEEG between groups, but higher peak systolic velocity of Doppler in middle cerebral artery was noted in the infants with poor outcome just after SHC therapy completion. All cases with abnormal signal intensity in the basal ganglion and thalamic area with/without extensive cerebral lesions on MRI had poor outcome.
CONCLUSIONS
Seizures, hyperglycemia and higher peak systolic velocity of Doppler in middle cerebral artery are the early predictors of poor neurodevelopmental outcome before the start of SHC therapy.

ABS 4

PRENATAL SURGERY OF MYELOMENINGOCELE: IS IT WORTH DOING?

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INTRODUCTION
Prenatal surgery of myelomeningocele (MMC) has shown to significantly decrease needs of derivative valves installation as treatment of hydrocephalus in post natal stages. Moreover, it can reduce the proportion of children with herniation, and significantly improves neurodevelopment at 30 months of follow-up. It might be a good choice in countries where abortion is not allowed.
AIM
To report outcome of prenatal surgery of MMC at 1 year of age.
METHODS
10 children undergoing prenatal surgery of MMC in a hospital in Santiago de Chile were followed

and assessed when they were 1 year-old. Average birth weight (BW) was 1,806 ± 543 g. Median age at surgery was 24 weeks of GA (22-26) and median GA at birth was 33 weeks (25-36). All newborns were followed and assessed by an urologist, a neurologist, a neurosurgeon, a gastroenterologist and an attending pediatrician up to 1 year of age.

RESULTS

Only one patient required hydrocephalus shunt (10%, 1/10), and one (10%) presented a neurodevelopmental delay. Nevertheless, neurologic impairment of lower limbs was observed in 90% (9/10), neurogenic urinary bladder dysfunction in 70% (7/10) and anal dysfunction (severe constipation) in 60% (6/10).

CONCLUSIONS

In spite of the small number of cases, our experience in relation to the reduction of hydrocephalus shunting requirements and better neurodevelopment outcome is similar to that reported in international references. However, a high rate of motor, bladder and anal dysfunctions is seen when children are 1 year-old. There seems to be a clear benefit for these children at this age.

ABS 5

NEONATAL CEREBRAL SINOVENOUS THROMBOSIS: TWO CASES, TWO DIFFERENT GENE POLYMORPHISMS AND RISK FACTORS

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INTRODUCTION

Cerebral sinovenous thrombosis (CSVT) is an uncommon disease in the neonatal period and at higher risk of mortality and morbidity. Symptoms are often nonspecific and may include seizures, respiratory distress, lethargy and poor feeding. Herein, we reported two cases with CSVT who were found to have MTHFR C677T homozygosity and MTHFR A12986C homozygosity with different risk factors.

CASE REPORTS

Case 1

A 41-year-old, gravida 1 mother delivered a male baby at 33/7 of weeks gestation by caesarean section, with a birth weight (BW) of 2,240 g. He had transposition of the great arteries at fetal echocardiography. At birth he was intubated and started intravenous prostaglandin infusion. Septostomy was performed on the second day of life. On the third day after birth, the patient had focal seizures on the left arm. Phenobarbital stopped the seizures. Brain ultrasonography and EEG scan were normal. The MRI and MRI venography scan of the brain revealed thrombotic lesions in the superior sagittal sinus and the transverse sinus. He was started on subcutaneous low molecular weight heparin (LMWH) and adjusting of dose for factor Xa levels was done. After 2 weeks, control MRI of the brain revealed a minimal residue thrombosis in the left transverse sinus. LMWH was stopped on third month of life following a normal brain MRI scan. MTHFR gene analysis was positive for homozygotic mutation in MTHFR C677T. He is still on follow-up in our outpatient clinic with no neurologic deficits.

Case 2

A 20-year-old, gravida 1 mother delivered a male baby at 38/7 of weeks gestation by caesarean section, with a BW of 3,700 g. On admission, he had dehydration (weight loss 29%), lethargy and poor neonatal reflexes. Initial laboratory findings were as follows: blood sodium: 186 mmol/L, potassium: 7.4 mmol/L, creatinine: 4.8 mg/dL. Brain ultrasonography was normal. Renal ultrasonography revealed medullary nephrocalcinosis. The MRI and MRI venography scan of the brain showed thrombotic lesions in the transverse sinus. He received subcutaneous LMWH and adjusting of dose for factor Xa levels was done. The MRI after 2 months of discharge revealed absence of thrombosis. He had positive MTHFR A12986C homozygosity and PAI 4G/5G polymorphism. He is normal at neurologic examination at 5 months.

CONCLUSIONS

Cerebral sinovenous thrombosis is a multifactorial and life threatening disease. Treatment of underlying causes like sepsis, dehydration, congenital heart disease is very important in prothrombotic disorder. Evaluation and therapy of neonatal CSVT may prevent neonatal mortality and poor long-term neurodevelopmental outcome.

ABS 6

DEVELOPMENT OF PREMATURE BORN CHILDREN – WHAT ABOUT LANGUAGE, READING AND WRITING? THE SPEECH AND LANGUAGE PATHOLOGIST'S VIEW

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INTRODUCTION

It is known that premature born children are at risk for different kind of difficulties related to language, reading and writing. There are a plethora of studies suggesting a negative influence of adverse biological factors on language acquisition, specifically phonological processing and literacy in premature born children (Kirkegaard at al., 2006; Bayless and Stevenson, 2007; Luciana at al., 1999; Saavalainen at al., 2006). This negative influence can be observed in difficulties in language/ linguistic categories important for education and academic achievement – phonological awareness, phonological working memory and phonological naming.

METHODS

Two groups of children, prematurely born children (n = 34) and children born at term (n = 34) were compared on a set of phonological tasks at the average age of 10.2 year. The average gestational age of prematurely born children and term born children was 34.38 weeks (29-36) and 39.26 weeks (38-41), respectively. The children were matched according to chronological age, gender and maternal educational level. The used tasks encompass phonological synthesis and analysis, spoonerism tasks, repetition of nonsense sentences, letter sequences tasks, digit span.

RESULTS

Prematurely born children had poorer results on phonological processing tasks in comparison with term born group ($p < 0.01$). The biological variables are significantly predictive of phonological processing according to the results of regression analyses and quasi-canonical correlation analysis. Therefore biological predictors should be considered as risk indicators for lower language status. Poor language abilities often cause reading and writing problems which strongly determine academic achievement of these children.

CONCLUSIONS

The results emphasize that biological variables present in prematurity are indicators of risk for some specific aspects of cognitive development. Speech and language pathologist's monitoring from an early age and continuously during development in premature born children can prevent specific learning difficulties in school period.

ABS 7

CHARACTERISTICS AND DISCHARGE OUTCOMES OF INFANTS UNDERGOING THERAPEUTIC HYPOTHERMIA IN AMERICAN NICUS

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BACKGROUND

Therapeutic hypothermia (TH) has become a standard treatment for hypoxic-ischemic encephalopathy in American NICUs. Data regarding the characteristics and hospital discharge outcomes of TH-treated infants has been limited to randomized controlled trials.

OBJECTIVE

The objective of this study was to describe the characteristics and hospital discharge outcomes of infants undergoing TH in a nationwide sample of NICUs.

METHODS

The study comprised a descriptive review of neonates from a network of 330 neonatal intensive care units reported to the Pediatrix Clinical Data Warehouse (CDW). Data regarding demographics, hospital-based interventions, medication use and initial hospital discharge outcomes were collected. Continuous and categorical variables were compared, as were time-related trends.

RESULTS

The number of neonates treated with TH increased during the study period with a concurrent increase in the number of centers providing TH. While 51.9% of TH-treated infants received phenobarbital, only 28.6% received a diagnosis of seizures and only 25% of infants were discharged home on anticonvulsants. Mortality was 11.4%, with 79.4% of infants being discharged home and 9.3% transferred to other centers following TH. Median length of stay was 12 days. Few infants required adjunctive therapies (e.g. oxygen) at home. See **Tab. 1** for more complete data.

CONCLUSIONS

The survival of neonates in this cohort was higher than reported previously. Most infants who survive

Table 1 (ABS 7). Patient characteristics at time of discharge.

Variable	n (%)
Discharge type	
Home	1,842 (79.4)
Died	265 (11.4)
Acute transfer	140 (6)
Convalescent transfer	48 (2.1)
Transfer of service	25 (1.1)
Antiepileptic medications at discharge	
Phenobarbital	359 (19.5)
Levetiracetam	61 (3.3)
Phenytoin	4 (0.2)
Gastrostomy tube	146 (6.3)
Home oxygen	59 (2.5)
Tracheostomy placement	19 (0.8)
Home ventilator	6 (0.3)

Discharge age (days), median (10^{th}-90^{th} percentile): 12 (4-33).

do not require anticonvulsants or adjunctive therapies at initial hospital discharge.

ABS 8

PERINATAL STROKE: A LEADING CAUSE OF SEIZURES IN THE NEONATAL PERIOD. 4 YEAR EXPERIENCE IN A TERTIARY NEONATAL INTENSIVE CARE UNIT

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INTRODUCTION

Perinatal stroke is a focal brain disease that occurs during fetal and neonatal period. Though rare, some common recognised forms exist: Neonatal Arterial Ischaemic Stroke (NAIS), Neonatal Haemorrhagic Stroke (NHS) and Cerebral Venous Sinus Thrombosis (CVST). We aimed to assess the risk factors and outcome of acute perinatal stroke in term neonates.

METHODS

Retrospective analysis of a single tertiary Neonatal Intensive Care Unit's Stroke Registry over 4 years (January 2012-December 2015).

RESULTS

Sixteen patients were identified (50% male) with mean gestational age of 39 weeks (range 37-41). Eleven mothers (68%) had antenatal risk factors: 3/11 hypertension (2 with diabetes, 1 with pulmonary embolism), 3/11 prolonged rupture of membranes and 5/11 miscellaneous (bleeds/ miscarriages/reduced fetal movements). Eight required resuscitation at birth and 5 were born by emergency caesarean section. All presented with early seizures. In addition 4 had apnoeas, 3 non-specific neurological symptoms, one presented with poor feeding and one was encephalopathic. MRI showed NAIS in 8 (50%), NHS in 6 (37%) and CVST in 2 (12%). One with HSV-1 encephalitis received Therapeutic Hypothermia. 14/16 neonates survived to discharge while 2 received palliative care (one-multiple clotting factors deficiency, one-pontocerebellar hypoplasia). Short-term follow-up: 8 (57%) have adverse neurodevelopmental outcomes (4 – global developmental delay, 2 – hemiparesis, 1 – motor delay, 1 – delayed language skills) and 5 (36%) are normal.

CONCLUSIONS

Perinatal stroke is an important cause of neonatal seizures with recognisable risk factors and significant morbidity; hence emphasising importance of long-term follow-up. MRI neuro-imaging forms the cornerstone of diagnosis. Perinatal Stroke Registry can facilitate future collaborative research.

ABS 9

CARRIER SCREENING FOR FRAGILE X SYNDROME IN TAIWAN FROM 2013 TO 2015

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INTRODUCTION

Fragile X syndrome (FXS) is the most common inherited cause of mental retardation, which is caused by a CGG trinucleotide expansion of the fragile X mental retardation 1 (*FMR1*) gene. The incidence of FXS is approximately 1 in 3,600 males and 1 in 6,000 female. Therefore, it is important to well establish a carrier panel to provide more information and a choice of genetic screening for parents before having a child.

METHODS
From June 2013 to December 2015, a total number of 9,643 pregnant women were screened in Taiwan. We used a rapid polymerase chain reaction (PCR) based screening tool to estimate the distribution of the *FMR1* alleles and the prevalence of the premutation (PM) and full mutation (FM) of the *FMR1* gene.
RESULTS
Of the 9,643 pregnant women screened, 9,408 cases (97.56%) had normal *FMR1* alleles (<45 CGG repeats), and 219 cases (2.27%) were in the intermediate range (45-54 CGG repeats). These pregnant women are in the low-risk group (9,627, 99.83%). 15 cases with PM (55-200 CGG repeats) were identified as carriers, giving a carrier prevalence of 1:643 in Taiwan population. Moreover, 1 FM with FXS was identified. Then we performed prenatal diagnosis in 11 cases. 4 were normal, 5 had PM, and 2 had a FM allele.
CONCLUSIONS
Most pregnant women have no knowledge of their potential risk of delivering an affected child. Carrier screening in the maternal population for FXS provides a choice of prenatal genetic screening and is important for early diagnosis.

ABS 10

LENTICULOSTRIATE VASCULOPATHY IN NEONATES: CASES SERIES REPORT

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INTRODUCTION
Most brain injuries in neonates happen in the perinatal period or in the first hours of life, therefore neuroimaging studies are very important. Cerebral ultrasound (US) allows us to diagnose and detect brain abnormalities very early.
CASE REPORTS
Case 1: 27-week-old premature, female, emergency cesarean section for partial placental abruption. Administration of antenatal glucocorticoids and magnesium sulfate neuroprotection. At birth, cerebral US showed no significant findings and Cytomegalovirus (CMV) PCR in urine was negative. At 72 hours of life, she began enteral tolerance with breast milk with favorable evolution. During the first week of life she presented sepsis by *E. coli*. She recovered without sequelae, restarting breastfeeding at 25 days of life. At 28 days of life she presented with bad appearance, hypotension, pancytopenia, hepatosplenomegaly and oliguria; on suspicion of nosocomial sepsis, empirical antibiotic was started previous culture extraction. Cerebral US showed branched linear hyperechoic in thalamic region. CMV PCR was positive in urine and breast milk.
Case 2: 35-week-old premature (low birth weight) with malformation syndrome. At birth, cerebral US showed branched linear hyperechoic area in thalamic region. Postnatal karyotype: 47, XY (trisomy 13): Patau syndrome.
Case 3: late premature, second twin (diamniotic-dichorionic twin pregnancy) with normal cerebral US at birth and favorable evolution. At 10 days of life, the baby presented *Candida spp.* meningitis. Antifungal treatment was administrated for 21 days. After meningitis, cranial US showed branched linear hyperechoic zones in thalamic region.
CONCLUSIONS
Hyperechoic linear or branched images located in the thalamic region are called lenticulostriate vasculopathy, and have been described in recent years as an entity associated with different pathologies in the neonatal period. This alteration may be non-specific and found in healthy infants, however, the possibility of underlying disease should always ruled out, mainly infections or chromosomal defects.

ABS 11

CONGENITAL HYDROCEPHALUS SECONDARY TO ARACHNOID CYST: CASE REPORT

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INTRODUCTION
Arachnoids cysts are cerebrospinal fluid collections covered by arachnoid, constituting 1% of expansive intracranial injuries in children under 2 years old. The most common site is the temporal fossa, with suprasellar location having an incidence of 10%. They produce intracranial hypertension symptoms secondary to mass effect, as hydrocephalus and increasing head circumference are frequent in the neonatal period.

CASE REPORT
We report the case of a male full term newborn with prenatal diagnosis of obstructive supratentorial hydrocephalus, confirmed by fetal magnetic resonance imaging (MRI). Elective caesarean section. Adequate birth weight (3,020 g.) with Apgar 9/10, resuscitation not required. Macrocephaly with head circumference 38 cm (percentile > 97th), normotensive anterior fontanelle of 3.5 x 3.5 cm, without dysmorphic features; rest of physical and neurological examination was normal. Postnatal cerebral ultrasound confirmed hydrocephalus and documented a suprasellar cyst lesion. At 48 hours of life, brain MRI showed suprasellar cyst lesion (46 x 45 x 52 mm) causing ventricular enlargement, particularly left, midbrain and cerebellum deviation and compression. No symptoms since birth. At 7 day of life he manifested increase head circumference, bulging anterior fontanelle and vomiting syndrome. Endoscopic fenestration of cyst and ventriculostomy was performed. Histopathology was compatible with arachnoid cyst. Post-surgery procedure was without incident. At 2 months of life, with the baby presented intracranial hypertension symptoms that required ventriculoperitoneal shunt. Clinical and radiological favorable evolution after neurosurgery. The infant is currently asymptomatic.
CONCLUSIONS
Cranial ultrasonography is the first diagnostic option in neonates, but MRI is the gold standard technique in arachnoids cysts. The presence of symptoms is a criterion for surgery. Currently, neuroendoscopy is effective and safe and endoscopic fenestration is recommended as the procedure of choice for treatment.

ABS 12

ASSESSMENT OF SLEEP IN INFANTS DURING THE FIRST SIX MONTHS OF LIFE

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INTRODUCTION
Sleep study in children during the first 6 months of life is complex due to their high level of movement during sleeping period, as well as the fact that they sleep during movement on stroller, or in their mother's arms. We developed a specific algorithm to estimate sleep from activity and temperature data and compared its validity to sleep diaries. The synchronization between some mother-infant pairs on circadian rhythms was also evaluated.
METHODS
Ankle skin temperature and actigraphy were evaluated in 14 infants by means of two data loggers (Termochron iButton® and HOBO® Pendant G, respectively), located in baby socks. Temperature was recorded every 10 min, while activity every 2 min, over 3 consecutive days, at 3 months of age in 9 children and at 6 months of age in 5 children. Temperature and actimetry were normalized, and temperature inverted using the Circadianware 7.1 (Murcia, Spain) software. The mean of both normalized variables was calculated and data over 0.3 were considered as sleep (Ortiz-Tudela et al., 2014). Mothers kept a sleep diary by typing children's wake/sleep events in a watch that also recorded their temperature and activity.
RESULTS
The sleeping time estimated in the 14 children was 11.4 ± 0.7 hours/day, considering the mean value of the 3 consecutive days. Sleep was found to be 9.3 ± 0.9 hours/day when estimated directly from the mean wave of sleep, that tended to underestimate duration of sleep due to the high variability of sleep between days. The percentage of agreement with sleep diaries was above 90% (91% ± 8%), while just a 78% ± 8% if considered the data from the mean wave of sleep. However, arousals during the night were poorly detected. The 24h rhythm of both temperature and activity in the mothers correlated to the ones of their children ($r = 0.71$, $p = 0.050$ and $r = 0.76$, $p = 0.030$ respectively).
CONCLUSIONS
Study of sleep/wake rhythms in children from activity and temperature was quite successful using specific algorithms for children. However, arousals during the night were poorly detected.

ABS 13

RING 18: CLINICAL CASE

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INTRODUCTION
Ring chromosomes are rare chromosomal disorders that usually occur de novo. A ring chromosome is

formed due to the deletion of both chromosome ends. The ring 18 phenotype is associated with the anomalies found on the 18p and 18q deletion syndromes. Depending on the amount of chromosomal deletion, the following characteristics may occur: facial features, neurological changes, eyes and vision impairment, heart conditions, gastrointestinal and genitourinary issues, musculo-skeletal problems and restricted growth.

CASE REPORT

Herein we report the case of a 5 months-old baby, who presented at birth with dysmorphic features: slight low set ears, up slanting palpebral fissures, club foot and glanular hypospadias. During pregnancy, a fetal ultrasound showed restricted fetal growth, and a caesarean section was decided at 37 weeks because of a low variability pattern noticed on cardiotocogram. He was born with a birth weight of 2,375 g and was admitted to the neonatal intensive care unit for the first 36 hours with transitory tachypnea. He referred bilaterally at oto-acustic emissions. A gastroesophageal reflux was diagnosed, which improved after the introduction of a thickened formula. At 1 month of age a nystagmus was noticed.

RESULTS

During follow-up he performed head ultrasound (US), echocardiogram, encephalic MRI, abdominal and renal US, blood analysis with thyroid function and EEG, with no abnormalities. A chromosomal investigation showed 46 XY karyotype, with a ring-shaped chromosome 18. Now, at 5 months of age, he has been growing on 3th percentile, he has a mild development delay but he is making good progresses with neurodevelopment therapy. He is waiting for auditory evoked potentials to be performed at 6 months of age.

CONCLUSIONS

Ring 18 is a rare disorder with a variety of dysmorphic features. Although the facial features may point towards the condition, it is important to be aware of the need of a multifactorial study and approach. Genetic counselling and evaluation will be also of benefit.

ABS 14

REGIONAL SOMATIC OXIMETRY IN NEONATES OF DIFFERENT GESTATIONAL AGE IN NICU

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INTRODUCTION

Respiratory failure or inadequate oxygen delivery through the lungs into the blood remains one of the most common syndromes in NICU patients. Modern oxygenation monitoring systems do not always allow to estimate the imbalance between tissue oxygen delivery and consumption. Near-infrared spectroscopy (NIRS) provides monitoring of tissue oxygenation in real time.

METHODS

We recruited 99 newborns in Moscow Municipal Hospital #24. We used Equanox Model 7600 device with neonatal sensors placed over the liver in the right upper quadrant of anterior abdominal wall to measure somatic regional saturation ($sStO_2$). 26 healthy term newborns were examined as reference, 73 patients in NICU as the main group (17 term babies and 56 preterm newborns with GA 25-36 weeks (32 [28; 34]) (**Tab. 1**).

RESULTS

$sStO_2$ values were significantly lower in NICU patients compared to the reference group ($F[4;91] = 2.9$, $p = 0.03$). Depending on body weight, NICU patients were divided in 3 groups: 2,500 g and more (n = 21), 1,500-2,499 g (n = 28) and less than 1,500 g (n = 24). We found reduction of $sStO_2$ values in VLBW infants, ($F[2;92] = 13.6$, $p = 0.001$). In 6 patients (8.2%) $sStO_2$ data couldn't be recorded. We found an association between the impossibility to measure $sStO_2$ and VLBW (small for gestational age newborns) ($F[2;7] = 3.2$, $p = 0.05$). 12 preterm babies had PDA. $sStO_2$ values were significantly lower among babies with PDA in comparison with

Table 1 (ABS 14). Main characteristics of the 3 groups.

	Reference Group (healthy term newborns)	NICU Group	
		Group I (term newborns)	Group II (preterm newborns)
Number of children	26	17	56
Birth weight, g	3,630 [3,250; 3,800]	3,500 [3,320; 3,820]	1,640 [1,170; 2,115]
Apgar score at 1 min	8 [8; 8]	7 [6; 7]	6 [5; 7]
Apgar score at 5 min	9 [9; 9]	7 [7; 8.5]	7 [6; 7]
$sStO_2$	85 [80.5; 87.3]	82 [77; 86.5]	81.1 [69.5; 85]
SaO_2	-	93.5 [91.5; 97.3]	97.4 [94.6; 98.6]

$sStO_2$: somatic regional saturation.

the other preterm newborns (F[1;65] = 8.4, p = 0.005).

CONCLUSIONS

Decreased tissue oxygenation in VLBW patients may be a result of poor perfusion (ischemia). Decreased tissue oxygenation in preterm newborns with PDA may indicate a less effective oxygenation of abdomen both through the centralization of blood circulation and because of the increased volume of low oxygenated blood flowing into the abdominal aorta, with a significant right-to-left shunting. This may require attention and adjustment of therapy due to high risk of enterocolitis and other complications.

ABS 15

NEWBORN WITH ARACHNOID CYST – CASE REPORT

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INTRODUCTION

Primary arachnoid cysts are present at birth and are the result of developmental abnormalities in brain or spinal cord that arise during early weeks of gestation. Arachnoid cysts may occur with anomalies of corpus callosum, Chiari, skeletal and complex vascular malformations.

METHODS

The aim is to present two newborns with arachnoid cyst discovered after birth by the following tests: clinical and neurological investigations, US exam, MRI, total blood cells, glycemia, CRP, ELISA on TORCH and Epstein-Barr virus.

CASE REPORT

Case 1: female newborn from second pregnancy of a 30-year-old woman. At sixth months, the mother had sinusitis, high fever, and was treated with antibiotics. *Candida spp.* was detected in vaginal smear at ninth month. Delivery was finished by cesarean section due to central placenta previa. The newborn was born at 37/38 weeks gestation with birth weight (BW) 2,700 g, birth length (BL) 51 cm, head circumference 32 cm, Apgar 8/9. The newborn was vital, hypotonic, with other normal clinical findings. Endocranial US showed presence of a cystic formation in right lateral ventricle level, with normal sized ventricles. Endocranial MRI showed arachnoid cyst in right ventricular trigone with mild lateral ventricle displacement. Other ventricular system parts were normal. Neurological exam showed generalized hypotonia.

Case 2: female newborn from second pregnancy of a 27-year-old woman. The newborn was born at term with BW 3,850 g, BL 55 cm, head circumference 35 cm, Apgar 9. The newborn was vital, with normal clinical findings, and presented hypertonia. Endocranial US and MRI showed presence of arachnoid cysts and agenesis of the corpus callosum with hypertrophy of the hippocampal commissure. Laboratory tests were in normal range in both children. Prenatal and intrauterine infections were ruled out.

CONCLUSIONS

Localization and size of the arachnoid cyst determine symptoms and manifestation period. The significance of monitoring the cysts by US and measuring their size throughout the first year of life lies in the possibility of their dilatation and symptom manifestation. Neurosurgical treatment is conducted only in case of neurological deficit progression or hydrocephalus development.

ABS 16

PROGNOSTIC VALUE OF APPARENT DIFFUSION COEFFICIENT VALUES IN NEWBORNS WITH HYPOXIC-ISCHEMIC ENCEPHALOPATHY TREATED WITH THERAPEUTIC HYPOTHERMIA

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INTRODUCTION

Low apparent diffusion coefficient (ADC) quantification in first days of life (DOL) in term infants with hypoxic-ischemic encephalopathy (HIE) has good predictive value of adverse neurological outcome. Most of the studies to date have reported results based on magnetic resonance imaging in a long postnatal age rank (1 to 18 days). The aim of our study was to investigate the value of ADC quantification on the fifth DOL. Brain regions of interest (ROIs) were standardized and ADC in these locations was measured and related to outcome in neonates with HIE treated with therapeutic hypothermia (TH).

Table 1 (ABS 16). Apparent diffusion coefficient (ADC) values measured at 4 to 6 days of life in regions of interest (ROIs) by prognosis in term infants with hypoxic-ischemic encephalopathy treated with therapeutic hypothermia.

	Normal	Death or abnormal neurodevelopment	p
PLIC	100.75 (79.7-118.7)	87 (51.6-119.75)	**0.0001**
Thalamus	93.6 (77.9-103.1)	78.75 (50-105.4)	**0.0016**
SOC	143.4 (102.5-173.3)	122.2 (60-173)	**0.0015**
Frontal WM	170.65 (83.5-194.4)	141.75 (57.8-190.6)	**0.0056**
Parietal WM	159.35 (85.4-179.1)	144.55 (53.6-163.1)	**0.0143**

PLIC: posterior limb of internal capsule; SOC: semioval center; WM: white matter.

METHODS

Prospective cohort study of term newborns admitted to the Neonatal Intensive Care Unit of Puerta del Mar Hospital (Cádiz, Spain) from 2009 to 2013 with hypoxic-ischemic encephalopathy treated with TH. All MR imaging examinations were performed in days 4 to 6 after birth and ADC values were measured in 13 ROIs. At 2 years age, neurological and neurodevelopmental assessments were performed using neurological examination and Bayley Scales of Infant and Toddler Development (BSID-III). Bivariate and multivariate analyses were used to study the association between ADC and composite outcome (death or survival with abnormal neurodevelopment).

RESULTS

54 term newborns where included in the study. We found an association between low ADC values and adverse outcome in posterior limb of internal capsule (PLIC) (100.75 vs. 8, p = 0.0001), thalamus (93.6 vs. 78.75, p = 0.0016), semioval center (143.4 vs. 122.2, p = 0.0015), frontal white matter (170.65 vs. 141.75, p = 0.0056), parietal white matter (159.35 vs. 144.55, p = 0.014) (**Tab. 1**). Receiver operating characteristics (ROC) analysis found PLIC and thalamus to have good predictive values (AUC 0.86 and 0.76).

CONCLUSIONS

Low ADC values measured at 4 to 6 DOL in PLIC, thalamus, semioval center, frontal white matter and parietal white matter in full term infants with HIE treated with TH are associated with poor outcome at 2 years.

ABS 17

PROGNOSTIC VALUE OF DIFFUSION-WEIGHTED IMAGING IN NEWBORNS WITH HYPOXIC-ISCHEMIC ENCEPHALOPATHY TREATED WITH THERAPEUTIC HYPOTHERMIA

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INTRODUCTION

Magnetic resonance conventional imaging (MRI) (T1- and T2-weighted sequences) might be normal despite significant brain injury in term infants with hypoxic-ischemic encephalopathy (HIE), especially when performed before 5 to 7 days of life (DOL). Due to these limitations diffusion-weighted imaging (DWI) has been increasingly used as an early marker of ischemia. It seems that DWI prognostic markers are equally accurate in cooled and non-cooled infants, although there are few studies that address this question. The aim of this study was to investigate the value of DWI done on fith DOL for outcome prediction in neonates with HIE treated with therapeutic hypothermia (TH).

METHODS

Prospective cohort study including term newborns admitted to the Neonatal Intensive Care Unit of Puerta del Mar Hospital (Cádiz, Spain) from 2009 to 2013 with HIE treated with TH. All MRI examinations were performed between 4 and 6 DOL and were evaluated by 2 neuroradiologists. At 2 years age, neurological and neurodevelopmental assessments were performed using neurological examination and the Bayley Scales of Infant and Toddler Development (BSID-III). The association between visible DWI abnormalities and composite outcome (death or survival with an abnormal neurodevelopment) was analyzed.

RESULTS
54 term infants were included. 30 patients (55%) had normal DWI, 13 (24%) showed basal ganglia pattern, 8 (14.8%) developed watershed injury, and 3 (5.5%) developed near total injury. DWI abnormalities correlated with adverse outcome (LR = 31, p = 0.0001, pseudoR2 = 0.45). 24 patients had pathological DWI findings with adverse outcome in 17 cases (70%). 29 patients of 30 (80%) with normal DWI developed normally. Precision and predictive values for DWI: sensitivity: 94.44%; specificity: 80.56%; PPV: 70.83%; NPV: 96.67%, AUC 0.87).
CONCLUSIONS
In full term infants with HIE treated with TH, DWI abnormalities at 5 days of life are good predictors of poor outcome at 2 years.

ABS 18

FETAL-TO-NEONATAL TRANSITION UNDER HYPOXIC ATMOSPHERE IN BRAIN

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INTRODUCTION
Birth asphyxia is one of the main complications during the perinatal period. Recently it has been shown that oxygen overexposure during resuscitation induces oxidative stress (OS) and increases mortality. We speculated that delaying postnatal oxygenation status would preserve reducing equivalents, enhance redox adaptation, and protect the brain.
AIMS
To assess oxidative stress and inflammation status during fetal-to-neonatal transition (FNT) under different values of FiO_2 in brain of mice pups.
METHODS
FiO_2 in pregnant mice was reduced from 21% to 14% (Hx14) or kept in room air (Nx21) at G18 (24 hours before delivery). 8 hours after birth both groups were switched to room air (Hx14/21 and Nx21/21 groups) or subjected to hyperoxia (FiO_2 = 100%) (Hx14/100 and Nx21/100 groups) and reset to 21% after 1 hour. At P1 pups were sacrificed and brains were snap frozen and kept at -80ºC until analysis. We set up a Mass Spectrometry (MS) method for selected biomarkers:
i. m-tyr/phe,
ii. o-tyr/phe,
iii. 3NO2-tyr/p-tyr,
iv. 3Cl-tyr/p-tyr,
v. 8-OHdG/2dG,
vi. GSH/GSSG.
These biomarkers ratios allowed to study cerebral OS and inflammation. Mitochondrial morphology, area and count were performed by electron microscopy.
RESULTS
Hypoxia did not induce significant changes in any of the biomarkers. By contrast, hyperoxia caused significant increase in m-tyr/phe and 3Cl-tyr/p-tyr. Remarkably, pre-conditioned hypoxia abrogated the rise of m-tyr/phe, 3Cl-tyr/p-tyr and 8-OHdG/2dG induced by hyperoxia as well as a decrease in the o-tyr/phe. Moreover, GSH/GSSG in brain was significantly higher in the Hx14/21 group as compared to controls and rest of the group P1 with a reduced concentration of GSSG revealing a reduced oxidative stress. Mitochondria showed better morphology and characteristics in hypoxic atmosphere (Hx14/21) and adaptation in re-oxygenation (Hx14/100).
CONCLUSIONS
Our results support the fact that FNT under hypoxic conditions maybe protective, especially to confront a hyperoxic insult after birth (e.g. resuscitation).

ABS 19

NORMAL MRI IN CHILDREN FROM THE PORTUGUESE CEREBRAL PALSY REGISTRY

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INTRODUCTION
Magnetic resonance imaging (MRI) may help ascertain the prognosis and etiology of cerebral palsy (CP). In some children with CP, MRI is normal. The epidemiology of children with CP and normal MRI is described.
METHODS
Nested case-cohort study based on data from active surveillance of 5-years-old children with CP born in Portugal in the period 1996-2010. SCPE definitions, functional classifications (GMFCS, BMFM, MACS, IQ, vision, hearing, communication) and MRI classification of pediatric MRI based on the predominant pattern were used. Chi-squared test and Odds Ratios were calculated.
RESULTS
From 1,532 reported cases, 1,459 children residing in Portugal at age 5 were considered. Neuroimaging was reported in 1,095 (75%), MRI was performed in 944 (65%) and a report was available for classification in 732 (50%) children. The sample included 56.5% born at term, 77.5% with spastic CP (51% bilateral), 8.3% post-neonatal CP. The following MRI patterns were predominant: Congenital anomaly (A) 14.6% (107), White matter lesion (B) 39.5% (289), Grey matter lesion (C) 29.1% (213), Miscellanea (D) 9.3% (68) and Normal (E) 7.5% (55). The typical 5-year-old child with CP and normal MRI was male, born at term, normal Apgar score, no early neonatal seizures or epilepsy later on, presenting bilateral spastic CP, scoring levels I-II/V for most functional classifications, no sight or hearing impairment, IQ < 50 and in regular pre-school. Normal MRI was present in 28% of cases of ataxic, 15% of dyskinetic, 15% of unclassified and 5% of spastic CP. The Odds for having CP and normal MRI were significantly higher for males, those born at term, those having bilateral or predominately non-spastic CP (higher if ataxic CP), an identified post-neonatal cause and no sight impairment.
CONCLUSIONS
MRI may be normal in 7.5% of 5-year-old children with CP, the proportion being much higher if CP is predominately non-spastic. The odds for normal MRI are higher in those born at term and when a post-neonatal cause was identified.

ABS 20

A FAMILY CASE OF DISTAL 22Q11.2 MICRO-DUPLICATION

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INTRODUCTION
Distal chromosome (CRM) 22q11.2 microduplication is a rare condition, with over 50 cases reported. They are frequently inherited and show phenotypic variability. We notify 2 cases in the same family.
CASE REPORT
A preterm newborn (28^{+1} w, 880 g) with neonatal backgrounds of early-onset sepsis, bronchopulmonary dysplasia, patent ductus arteriosus, exchange transfusion for hyperbilirubinemia, severe rickets and profound bilateral sensorineural hearing loss. Growing up, he developed a peculiar phenotype: short length, broad forehead, macrocephaly, epicanthal fold, brachydactyly (**Fig. 1**). An MRI was performed with mild ventriculomegaly. At the age of 4 he presented a moderate language disability

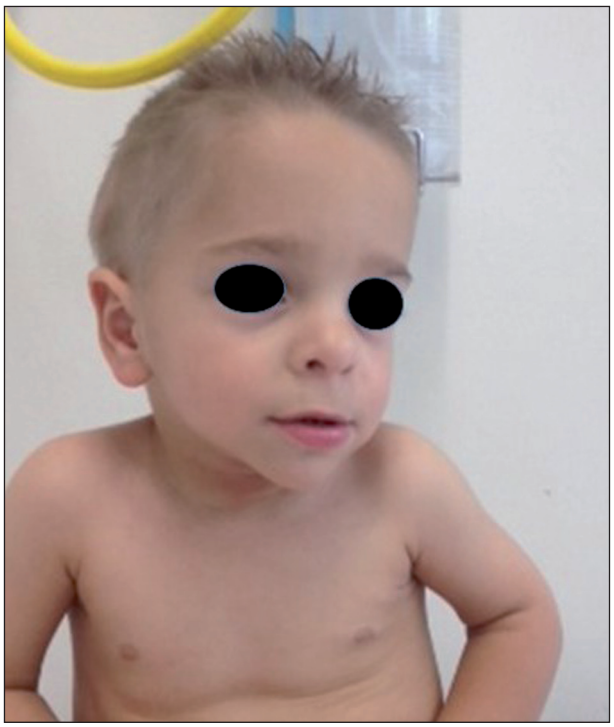

Figure 1 (ABS 20). Peculiar phenotype of a patient with distal chromosome (CRM) 22q11.2 microduplication.

(not motor). His mother showed a similar phenotype plus lumbar hyperlordosis, without learning disabilities. A microarray-based comparative genomic hybridization (aCGH) showed a 1.5Mb sequence of CRM 22(q1.21-11.22) with three copies instead of two. The extension study carried out in the family found the same duplication in the mother.

DISCUSSION

Distal 22q11.2 microduplication presents with a varied range of characteristics and inter-individual variability, even within the same family. The only facial dysmorphism observed in more than 50% of reported individuals is broad forehead, as both patients presented. Skeletal anomalies are noted in 50%, our two cases showing just brachydactyly. Unlike 22q11.2 deletion, cardiac malformations are unusual. Developmental delay is observed in 67%, with variable degrees of language and motor disability, and no phenotype-genotype correlation. Different patterns of hearing loss have been described. In index patient, there is no motor delay, but a moderate language impairment, that could be due to hearing loss, as well as to prematurity.

CONCLUSIONS

In preterm patients with developmental delay, a family peculiar phenotype should encourage us to search for underlying genetic conditions. An aCGH study can be considered if the karyotype is normal.

ABS 21

THE CORRELATION BETWEEN NEONATAL FACTORS AND SUBJECTIVE SCORES OF THE BAYLEY SCALES OF INFANT DEVELOPMENT-III IN PREMATURE INFANTS

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INTRODUCTION

Since advances in neonatal care allow survival of premature infants, neurodevelopmental follow-up of these infants is an essential part of ongoing evaluation of neonatal care. The Bayley scales of infant development (BSID) are the most widely used measure to assess neurodevelopment of very low birth weight (VLBW) infants.

OBJECTIVE

The aim of this study was to determine factors associated with poor outcomes, as measured by subjective scores of the BSID-III.

METHODS

The investigation was a retrospective study conducted in the neonatal intensive care unit in Seoul National University Children's Hospital between February 2010 and March 2014. The study included premature infants of < 32 weeks of gestational age or < 1,500 g in weight, and BSID-III were done to assess developmental status at 8 and 18 month of corrected age.

RESULTS

A total of 138 neonates were enrolled. Infants with adaptive behavior score < 85 (n = 70) and with ≥ 85 (n = 67) were compared. The head circumference at birth was significantly different (24.63 ± 2.54 cm vs. 25.66 ± 2.55 cm, p = 0.04). There were significant differences in the admission z-score and discharge z-scores of both body weight (-1.31 ± 1.32 vs. -0.52 ± 1.47, p = 0.017) and height (-2.84 ± 1.66 vs. -1.73 ± 1.47, p = 0.016) between the two groups. The lower adaptive behavior score group was significantly correlated with the lower language score (p < 0.001).

CONCLUSIONS

Δ z-scores of body weight and height, and head circumference at birth were significantly different in the lower adaptive behavior score group. The lower adaptive behavior score was correlated with the lower language score. Further prospective large cohort studies are needed to determine the meaning of adaptive scores of BSID-III for predicting long-term outcomes.

ABS 22

DECREASED CEREBRAL GLUCOSE METABOLISM USING F-18 FDG BRAIN PET/CT IN VERY LOW BIRTH WEIGHT INFANTS WITHOUT STRUCTURAL ABNORMALITY ON BRAIN MRI

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OBJECTIVE

To evaluate clinical significance of decreased cerebral glucose metabolism in very low birth weight

infants (VLBWI) without structural abnormality on brain MRI.

METHODS

Forty VLBWI (gestational age [GA]: 24-29 weeks), who had no structural abnormality (severe intraventricular hemorrhage, cystic periventricular leukomalacia, punctate lesion, loss of volume, and ventricular dilatation) on brain MRI, were enrolled. All infants performed brain MRI and fluorine-18 fluorodeoxyglucose (F-18 FDG) brain PET at term-equivalent age. F-18 FDG brain PET images were quantitatively analyzed using the infant automated anatomic labeling template after spatial normalization. The regional glucose metabolic ratio (MR) and asymmetric index (AI) for each VOI of the cerebral cortices, striatum and thalamus were calculated. Asymmetric glucose metabolism was considered as significant when AI is higher than 110% or lower than 90%. Statistical parametric mapping (SPM) was used to investigate the correlation between MRs and clinical factors.

RESULTS

Seventeen infants (42.5%) had right > left asymmetry and three infants (7.5%) had right < left asymmetry of the cerebral glucose metabolism. The MRs of the left cerebral cortices, striatum and thalamus were significantly lower than those of right cerebral cortices, striatum and thalamus. The regional MRs were significantly correlated with GA and birth weight. SPM analysis revealed significant differences on glucose metabolism between infants with and without multiple gestation, premature rupture of membrane, and bronchopulmonary dysplasia.

CONCLUSIONS

VLBWI had relatively low glucose metabolism of the left cerebral hemisphere compared with the right cerebral hemisphere. Decreased cerebral glucose metabolism may be related with risk factors for poor neurodevelopmental outcome in VLBWI. Further studies are needed for evaluation of long-term neurodevelopmental outcomes to assess predictive accuracy of F-18 FDG brain PET.

ABS 23

NOVEL BIOMARKERS FOR PERINATAL ASPHYXIA: ALTERATIONS OF THE CDP-CHOLINE PATHWAY

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INTRODUCTION

Hypoxic-ischemic encephalopathy (HIE) as a result of perinatal asphyxia is a major cause of neurologic disabilities and mortality in the term neonate. Novel biomarkers could help to provide a prompt identification of infants at risk of developing moderate to severe HIE in the first hours.

METHODS

Animal experiments were carried out at Oslo University Hospital (Norway). Piglets were randomly assigned either to the hypoxia and reoxygenation group (intervention group, n = 26) or the control group (n = 6) without exposure to hypoxia. Plasma samples were taken in EDTA tubes before the start of hypoxia, at the end of hypoxia, 120 min after reoxygenation and 540 min after reoxygenation. Urine samples were withdrawn 300 min after reoxygenation. All biofluids were stored at -80°C. Choline, betaine, cytidine and uridine were determined in plasma and urine samples employing Liquid Chromatography coupled to tandem Mass Spectrometry (LC-MS/MS). In addition, lactate was determined in plasma samples.

RESULTS

At the time points 'End Hypoxia' (for choline, cytidine and uridine) and 'REOX 120 min' (choline and cytidine), significant differences were found between the control and intervention groups. For betaine at 120 min after reoxygenation, differences between the control and intervention group were detected. In urine samples no statistically significant changes were observed. However, choline concentrations in the intervention group showed a trend to higher concentrations. Receiver operating characteristics (ROC) curves were calculated. The combination of choline and related metabolites with lactate values provided improved prognosis of hypoxia in terms of sensitivity and specificity.

CONCLUSIONS

The present study showed the potential of choline and related metabolites as biomarkers for hypoxia. Their clinical applicability is to be confirmed in future studies involving the analysis of samples from clinical trials on newborns suffering from HIE.

ABS 24

SUPRATENTORIAL BRAIN GROWTH THROUGH TRIDIMENSIONAL ULTRASOUND IN THE VERY LOW BIRTH WEIGHT PRETERM INFANT

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INTRODUCTION

Magnetic resonance linear measurements at term corrected age (TCA) have been proven of prognostic value in very low birth weight preterm infants (VLBW). Fetal neurosonography is mostly based on linear measurements of brain structures. Nevertheless there is little data regarding longitudinal growth of supratentorial structures in the preterm.

OBJECTIVES

To evaluate normal supratentorial brain growth through tridimensional ultrasound in the VLBW preterm from birth to TCA.

METHODS

Prospective cohort study in VLBW preterm infants admitted to the NICU of Hospital Universitario Puerta del Mar (2010-2013). After assessing for normal neuroimaging findings and normal neurodevelopment at 2 years, 3D serial ultrasounds were analysed. Linear measurements were: bifrontal diameter (BFD), biparietal diameter (BPD), ventricular index, atrium and corpus callosum length. Intraclass correlation coefficient was estimated to assess reliability.

RESULTS

520 ultrasounds of 160 preterm infants were analysed. ICC was 0.7 and 0.99 for minimum and maximal intra- and inter-reliability. Hemispheric growth (BFD and BPD) was related to postnatal age with a more accentuated growth rate after 35 weeks corrected age. Corpus callosum was found to have a constant growth rate (1.7 mm/week). Hemispheric growth did not reach term control measurements at TCA ($p < 0.05$). Atrium width was not found to be related to gestational age. Ventricular index measurements had an excellent correlation with previous published data (absolute agreement ICC = 0.76; $p < 0.001$).

CONCLUSIONS

Ultrasound cerebral linear measurements in the preterm infant are highly reliable and reproducible. Our study has improved our knowledge on normal brain growth and normative data are shown in order to be used in the clinical settings.

ABS 25

NORMAL CEREBELLAR GROWTH THROUGH TRIDIMENSIONAL ULTRASOUNDS IN THE VERY LOW BIRTH WEIGHT PRETERM INFANT FROM BIRTH TO TERM CORRECTED AGE

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INTRODUCTION

In normal very low birth weight infants (VLBWI) there are no longitudinal studies aimed to describe normal cerebellar growth. However, this is a fundamental aspect in improving our knowledge of infratentorial development in order to further relate its impairment with direct or supratentorial injury.

OBJECTIVES

To evaluate cerebellar normal growth in VLBWI from birth to term corrected age (TCA) and compare growth rate with intrauterine growth and with control term newborn measurements.

METHODS

Prospective cohort study including preterm infants ≤ 1,500 g and/or ≤ 32 gestational weeks (GW) admitted to the NICU of Hospital Universitario Puerta del Mar without acute brain injury and with normal neurodevelopment at 2 years. Linear measurements and vermis area are measured from 3D ultrasounds. Intraclass correlation coefficient is estimated to asses reliability.

RESULTS

520 ultrasounds of 160 preterm infants were analysed. There was a positive linear relation of cerebellar measurements with gestational age, with a higher growth rate after 35 GW for vermis height and transversal cerebellar diameter. After 36 weeks (corrected age) cerebellar measurements reached those of term controls. Excellent correlation was found with fetal growth (ICC = 0.948). ICC was

0.985 and 0.957 for intra- and inter-reliability, respectively.

CONCLUSIONS

Cerebellar growth is tightly related to postnatal age. Extrauterine life does not affect normal cerebellar development in the absence of brain injury. Normative data and nomograms have been developed from our data in order to be used in the clinical settings. Linear measurements from 3D ultrasounds have proven to be reliable and highly reproducible.

ABS 26

AN INFANT WITH HUNTER SYNDROME AGGRAVATED BY A COMMUNICATING HYDROCEPHALUS

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INTRODUCTION

Mucopolysaccharidosis type 2 (Hunter syndrome, MPS 2, OMIM#30990) is an X-linked lysosomal storage disease caused by a deficiency of iduronate 2-sulfatase (IDS). There is an accumulation of heparan and dermatan sulphate in a variety of tissues that results in a progressive, multisystem disorder, also affecting the central nervous system. Neurological complications of Hunter syndrome include ventriculomegaly, hydrocephalus, seizures, mental retardation, hearing loss and carpal tunnel syndrome. Typically, hydrocephalus is a rare finding in patients with genetic metabolic disorders. In MPS, the youngest patient with hydrocephalus described in the literature was 14 months old.

CASE REPORT

We present a case of a boy with MPS2, aggravated by acute hydrocephalus at the age of 9 months. The infant was diagnosed with Hunter Syndrome at 1 month of age, first in a screening urinary mucopolysaccharide test, then confirmed by a genetic test, which demonstrated a hemizygous mutation in exon 9 of the IDS gene c. 1402C>T (p. Arg468Trp). The genealogical tree is presented in **Fig. 1**. The patient presented with a macrocephaly from the beginning, but no hydrocephalus was observed in the head ultrasound at 4 months of his life. At the age of 7 months, the baby was initiated on the enzyme replacement therapy with Elaprase. Two months later, the boy was hospitalized with symptoms of acute hydrocephalus, which was later confirmed by head imaging (CT and MRI) and required placement of a ventriculo-peritoneal shunt.

CONCLUSIONS

There are few reports of communicating hydrocephalus in mucopolysaccharidoses and none has been diagnosed at such a young age. Further studies are needed to assess the necessity to introduce repetitive brain ultrasound examinations from early

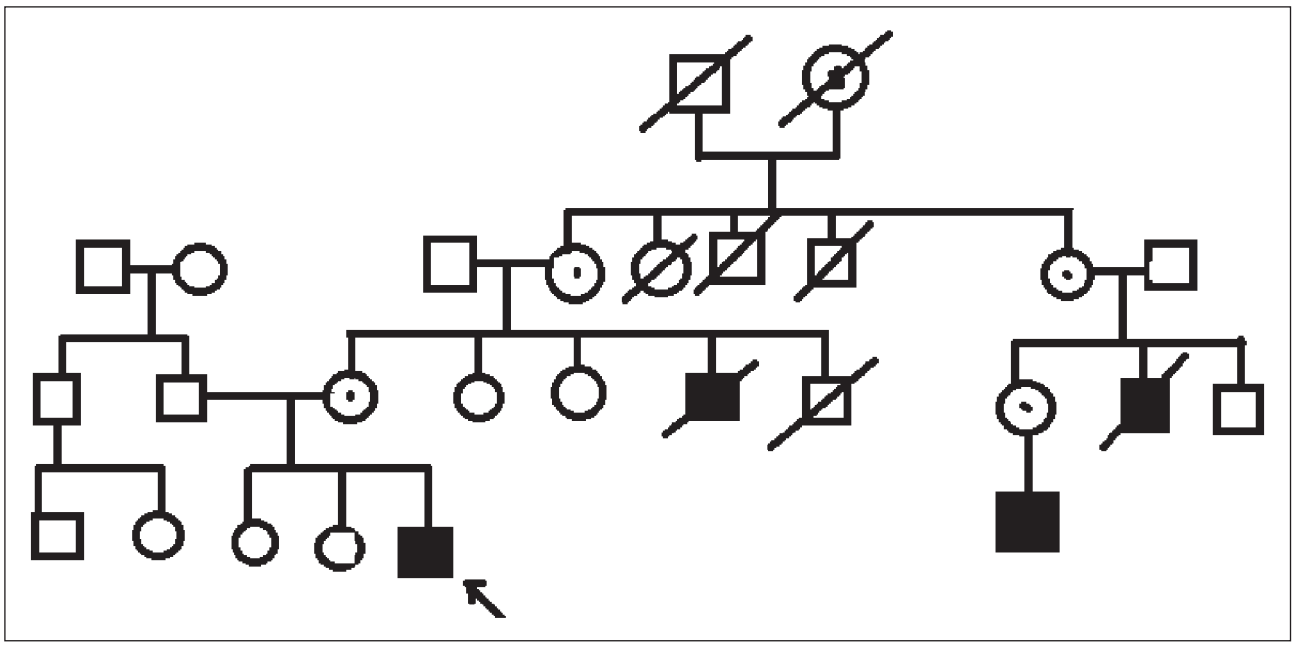

Figure 1 (ABS 26). Genealogical tree of the infant with Hunter syndrome.

infancy. Prompt detection of this neurological complication and targeted management should be recommended as part of a multidisciplinary approach to improve patient's quality of life.

ABS 27

DIFFERENCES IN HEMODYNAMIC CONTROL OUTCOMES WITH SYSTEMICALLY COOLING OR SELECTIVE HEAD COOLING

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INTRODUCTION

Therapeutic hypothermia has become the standard treatment for neonatal hypoxic ischemic encephalopathy. It is thought that systemically cooling affects hemodynamic control much more than selective head cooling. We reported differences of influence on hemodynamic control with systemically cooling or selective head cooling.

METHODS

We studied the medical records of 45 infants with severe neonatal asphyxia who underwent therapeutic hypothermia between January 2001 and March 2016 in the neonatal intensive care unit of our hospital. 45 infants were divided to 13 infants who underwent systemically cooling and 32 infants who underwent selective head cooling. Hypotension was defined as mean ABP below 40 mmHg for a few hours.

RESULTS

There were no statistically significant differences for gestational age, birth weight, Apgar scores at 5 minutes, umbilical cord blood pH, and lactic acid between both groups. During therapeutic hypothermia, 29 from 45 infants had hypotension requiring intervention, from which volume loading was undertaken in 21 infants (saline only in 13), increased catecholamine administration in 15, and steroid administration in 4. Volume loading was undertaken once in 15 infants and twice in 6 infants. Blood pressure decreased in 8 infants who underwent systemically cooling and 21 infants who underwent selective head cooling, which was statistically insignificant. Comparison of maximum dose of dopamine and dobutamine, proportion of neonates who underwent steroid administration, and those who underwent volume loading showed differences between all the groups that were not statistically significant.

CONCLUSION

In our study, there was not a difference in the outcomes of hemodynamic control with different cooling method. And there is no difference for hemodynamic management. It is thought that we can manage infants safety with systemically cooling as well selective head cooling.

ABS 28

ACADEMIC PERFORMANCE IN PRETERM CHILDREN BORN IN THE ANTENATAL STEROIDS AND SURFACTANT ERA: A META-ANALYSIS

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INTRODUCTION

Advances in neonatal healthcare, such as the introduction of antenatal steroids and surfactant, have resulted in a decrease in mortality after preterm birth, but have not led to parallel decreases in morbidity. Academic performance provides an important window of investigation of outcomes of preterm children and gives insight into the specific difficulties and needs of these children. This meta-analysis studies academic performance in preterm children born in the antenatal steroids and surfactant era. In addition, possible moderating effects of perinatal and demographic factors on academic performance are explored.

METHODS

The databases PubMed, Web of Science, and PsycINFO were searched for peer-reviewed articles. Case-control studies reporting standardized academic performance scores of preterm children (< 37 weeks of gestation) at age five years or older, born in the antenatal steroids and surfactant era were included. Seventeen studies were selected, including 2,332 preterm children and 1,512 controls. Random-effects meta-analyses were performed to compute combined effect sizes for general academic performance, arithmetic, reading, spelling, and

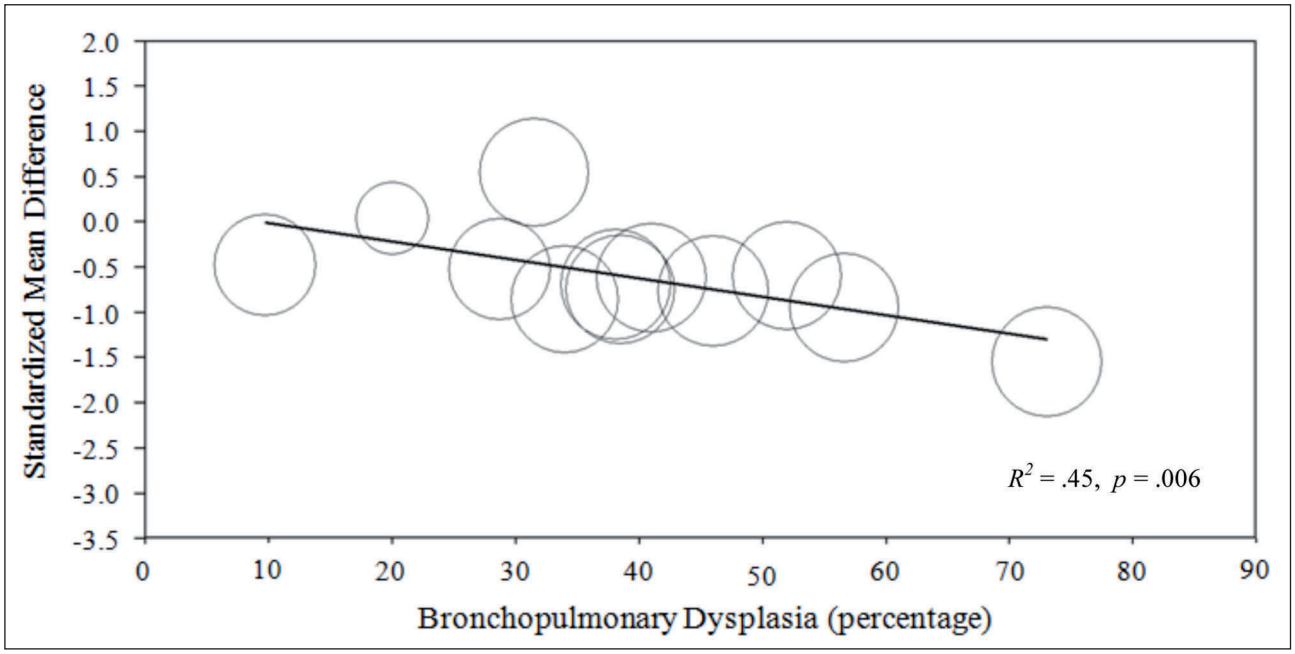

Figure 1 (ABS 28). Meta-regression of bronchopulmonary dysplasia on the standardized mean difference in academic performance between preterm and full-term children.

special educational needs. The moderating role of perinatal and demographic factors was studied using meta-regression analyses.

RESULTS

Preterm children scored 0.70 SD below full-term peers on arithmetic ($p < .001$) and 0.44 and 0.54 SD lower on reading and spelling, respectively ($p < .001$). Moreover, preterm children were 2.74 times more likely to receive special educational assistance than term controls (95% CI = 2.01-3.73, $p < .001$). Bronchopulmonary dysplasia explained 45% of the variance in academic performance ($p = .006$) (**Fig. 1**). Intelligence accounted for 28% of the variance ($p = .02$).

CONCLUSIONS

Preterm children born in the antenatal steroids and surfactant era show considerable academic difficulties. Preterm children with bronchopulmonary dysplasia are at particular risk for poor academic outcome.

ABS 29

OUTCOME PREDICTION IN PRETERM INFANTS WITH INTRAVENTRICULAR HEMORRHAGE USING A NEWLY DEVELOPED MRI BASED SCORING SYSTEM

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INTRODUCTION

Intraventricular hemorrhage (IVH) is a significant cause of morbidity and mortality in preterm infants. There is a well-known correlation between IVH grade and neurodevelopmental outcome. However, to our knowledge, no standardized scoring system taking into account severity and topography of injury is available.

AIM

The aim of the present study was to create an MRI based scoring system that could serve as a prognostic indicator with regard to outcome by assessing the functional areas affected by the bleeding.

METHODS

83 neonates born 2000-2015 with grade II-IV IVH who had MRI at term-equivalent age and assessment of neurodevelopmental outcome were included. MRIs were analysed by the computation of a grey matter (GMS: gyrus pre- and postcentralis, hippocampus, basal ganglia), white matter (WMS: pyramidal tract and PLIC, corpus callosum, optical radiation, crossroads) and a total MRI score which included: GMS, WMS and possible additional abnormalities (periventricular leukomalacia, hy-

drocephalus, cerebellar defects). Outcome was evaluated at 1, 2 and 3 years via Bayley Scales of Infant development. The predictive ability of MRI scores was evaluated using receiver-operating curves and area under the curve (AUC).

RESULTS

The AUC to distinguish between favorable and unfavorable outcome was slightly better for psychomotor (PDI = 0.81) compared to mental outcome (MDI = 0.76). We were further able to create a model that allows outcome prediction based on a combination of MRI score and gestational age.

CONCLUSIONS

There is currently not much evidence with regards to the relevance of severity and topography of injury when trying to predict outcome in preterm infants with IVH. The proposed score might fill this gap and serve as a prognostic tool with regard to neurodevelopmental outcome. Furthermore, it might provide the clinician with invaluable information to improve individually tailored counselling and guide future treatment in preterms with IVH.

ABS 30

NEUROPROTECTION WITH HYPOTHERMIA AND ALLOPURINOL. IS IT A GENDER QUESTION?

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INTRODUCTION

Hypoxic-ischemic encephalopathy (HIE) is one of the most important causes of brain injury and it is associated with mortality and long-term neurological sequels. Therapeutic hypothermia (TH) has become the only proved treatment for newborns after perinatal hypoxic-ischemic (HI) injury, but it does not provide complete neuroprotection. Allopurinol has been proved a good neuroprotector in animal studies, but it has never been tested in association with hypothermia. The aim of the present study was to evaluate the additional neuroprotective effect conferred by allopurinol when it is administrated in combination to TH.

METHODS

P10 rats were subjected to HI (Vannucci model) and randomized into 5 groups: Sham intervention (ST), no treatment (HIN), hypothermia (HT), Allopurinol (Alo), hypothermia + Allopurinol (HT + Alo). 72 h later, relative area loss, hippocampus volume and levels of caspase (by WB and immunofluorescence) were evaluated. Three weeks following HI, spacial learning was assessed via Morris water test.

RESULTS

Lost tissue area and hippocampus volumes were different among different groups (p = 0.001). The highest percentage of damage was in HIN, followed by Alo. There were no differences between ST, HT or HT + Alo. When they were evaluated by gender, regarding females, Alo group was no different to ST group. Caspase 3 expression was increased in HIN and Alo group. There were also differences when they were evaluated taken gender into account. Learning process was also analyzed by gender and condition. In females, Alo group had similar results than the other neuroprotective treatment groups.

CONCLUSIONS

HT + Alo is a good neuroprotective strategy, although in males it does not add many benefits to HT. In females, Alo and HT + Alo increase neuroprotection, reducing infarct volume and preserving hippocampus. Its neuroprotective effect was long lasting, as learning outcomes were significantly improved at adolescence.

ABS 31

SERUM LEVELS OF MANNOSE BINDING LECTIN (MBL) AND S100 PROTEIN B AS BIOMARKERS OF NEUROLOGICAL DAMAGE IN ASPHYXIATED NEWBORNS: POSSIBLE EFFECTS OF THERAPEUTIC HYPOTHERMIA. PRELIMINARY DATA FROM A PROSPECTIVE STUDY

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INTRODUCTION

Hypothermia is the standard of care in infants with hypoxic-ischemic encephalopathy (HIE). In

the brain Mannose Binding Lectin (MBL) may play a role in the ischemia-reperfusion injury because of complement activation. The genetic or pharmacological inhibition of the complement pathway reduces brain neutrophil accumulation, blood-brain barrier damage, apoptosis, and neurological sequelae. As S100B is an astrocytic protein specific to the CNS, it represents an important biomarker of brain injury. Our hypothesis is that hypothermia can influence the release of MBL and of S100B in HIE.

METHODS

We performed a prospective study on asphyxiated neonates, 28 cooled within 6 hours of birth and 10 uncooled. MBL and S100B were quantified at admission (T1) and at 7 days (T2), using an immunoassay (MBL oligomer ELISA, Antibody Shop, Copenhagen, DK; LIA-mat Sangtec 100 kit, Bromma, SE). We used a cut-off of 750 ng/ml to discriminate MBL deficiency and 50 pg/ml for S100B. We performed an MRI between days 7 and 10. Statistical analysis was performed by SPSS (statistically significant p value < 0.05).

RESULTS

Mean serum levels of MBL and of S100B at T1 and at T2 were similar in the two groups (p = 0.66 and p = 0.09 for MBL; p = 0.67 and p = 0.78 for S100B). MBL was significantly increased from T1 to T2 in group A (1,351.6 ± 841.9 vs 2,428.36 ± 1,403.5 ng/ml, p = 0.005) whereas S100B was significantly reduced (9,925.38 ± 20,198 pg/ml vs 379.6 ± 449 pg/ml, p = 0.05). In group B, MBL was significantly increased from T1 to T2 (1,512 ± 335.2 vs 3,426 ± 621 ng/ml p < 0.001) whereas S100B was similar (6,360.1 ± 6,690.3 vs 322 ± 111.7 pg/ml, p = 0.076). Brain MRI showed no differences between the two groups (p = 0.11).

CONCLUSIONS

MBL serum level seems to significantly increase in asphyxiated infants, regardless of treatment with hypothermia. Complement activation due to the inflammatory response may play a protective role. Conversely, S100B significantly decreases in cooled babies, probably because of a reduction in astrocyte damage.

ABS 32

THERAPEUTIC HYPOTHERMIA IN ASPHYXIATED NEONATES: EXPERIENCE FROM NEONATAL INTENSIVE CARE UNIT OF UNIVERSITY HOSPITAL OF MARRAKESH

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INTRODUCTION

Hypoxic-ischemic encephalopathy (HIE) is an important cause of death or neurologic morbidity affecting two to three infants per 1,000 live births term. Therapeutic hypothermia is now recommended in current practice. This treatment protocol is applied in our department since June 2012.

OBJECTIVE

To evaluate the feasibility and effectiveness of this technique in the treatment of neonates with HIE.

METHODS

Prospective study of newborns admitted for HIE since 2012. The feasibility of the protocol was appreciated by observance of its use for 72 hours, the provenance of newborns having benefited and the time of use. The results were studied by comparing a newborn group who received hypothermia to a control group.

RESULTS

Seventy-two cases have been admitted to the unit for HIE since 2012. Ten cases had HIE Sarnat I; among 62 cases, only 19 cases received the hypothermia protocol for different reasons, with arrival beyond six hours of life accounting for 41% cases as the main cause. For the 19 neonates treated, the protocol was applied before six hours of age. Complications of asphyxia were comparable in both groups, with greater pulmonary hypertension recordings in the control group. Loss of sight was more pronounced in the control group. The long-term follow-up of newborns of protocol group was normal in almost half of cases.

CONCLUSIONS

Our first experience with the controlled therapeutic hypothermia supports its beneficial effect in newborns with HIE. This treatment must be available at all centers involved in the care of these neonates in Morocco. The main difficulty in our context remains the limits of infrastructures, preventing many newborns from receiving this beneficial treatment.

ABS 33

FIRST EXPERIENCES IN THERAPEUTIC HYPOTHERMIA TREATMENT OF HIE IN THE PERIOD JANUARY 2011-DECEMBER 2011

IN NICU AT UNIVERSITY CLINICAL CENTER SARAJEVO

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INTRODUCTION

The NICU at University Clinical Center Sarajevo has been operational since late nineties. Neonatal therapeutic hypothermia has been introduced in 2011, while passive hypothermia was utilized beforehand.

METHODS

This retrospective study reviewed the first 23 patients (11 females, 12 males) treated for HIE at our NICU in the period January 2011-December 2011, when controlled induced hypothermia was first introduced in the department. Patients were treated according to the Bristol Protocol (Cool Cap-Gluckman et al., 2005, Toby-Azzopardi, 2009).

RESULTS

Patients were born at 36-41 weeks of gestation with mean birth weight of 3,336 g (range 2,200-4,350 g). Causes of asphyxia were identified in 7 newborns: placental abruption (3), umbilical cord prolapse (1), imminent uterus rupture (1), and congenital anomalies (2). Congenital anomalies were diaphragmatic hernia and mediastinal teratoma. Hypothermia was introduced at an average period of 5 hours (12 hours in 3/23 patients). The most common associated conditions were MAS in 9/23 patients, followed by pulmonary hypertension (1), pneumothorax (1) and renal failure (1). Hemodynamics disturbances were as follows: hypotension (18), hypertension (3), bradycardia (HR 120) (7). The most frequent electrolyte disturbances during treatment were hyponatremia, hypocalcemia, hypokalemia, hypomagnesemia (< 1 mmol). Sepsis was noted in 8 patients, manifest convulsions in 9, while coagulopathy (platelets < 150 and/or increased APTT and INR) in 7, hypoglycemia in 8 (blood glucose 8.0) patients.

CONCLUSIONS

Four patients died. The neurologic status at discharge was the following: normal status was found in 9, diminished muscle tone and good primitive reflexes in 5 patients, weakened reflexes and muscle tone in 1, increased muscle tone and weak primitive reflexes in 1 and no primitive reflexes and diminished muscle tone in 1 patient.

ABS 34

THE EFFECT OF PHOTOTHERAPY ON THE ELECTROCORTICAL BRAIN ACTIVITY IN TERM NEWBORNS MEASURED BY AMPLITUDE-INTEGRATED EEG – PILOT STUDY

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INTRODUCTION

Amplitude-integrated electroencephalography (aEEG) is a simplified bedside neurophysiology tool that has become widely used in neonates in the last few years. In our work we studied the effect of phototherapy on electrocortical activity of the brain in term neonates.

METHODS

The measuring device was Unique CFM, Dartin. Due to the non-invasive approach the hydrogel electrodes were used to measure and to obtain a single-channel aEEG record. The main criterion for inclusion of the newborns into the study was hyperbilirubinemia. Phototherapy was indicated on the basis of AAP criteria. Measurements were taken between the first and fourth day of age. The first measurement was done before the start of phototherapy. Newborns had their eyes covered so that identical measurement conditions before and during phototherapy were ensured. The second measurement was taken during phototherapy. Each measurement lasted for two hours. On record we described the minimum, maximum, and mean amplitude, sleep-wake cycle, continuity of pattern and we used Burdjalov score system for classification.

RESULTS

In our study we included eight healthy and eutrophic newborns born at term. The average value of bilirubin was 231.6 umol/l. The average low and high amplitude was higher before starting phototherapy. During phototherapy the value of upper and lower amplitude decreased on average by 2 mV. We did not observed changes in sleep-wake cycle. Width of amplitude in Burdjalov score did not differ before and during phototherapy. Results are presented in **Fig. 1**.

CONCLUSIONS

It has been demonstrated that phototherapy has an effect on the function of subcortical centers and the autonomic nervous system. It can therefore

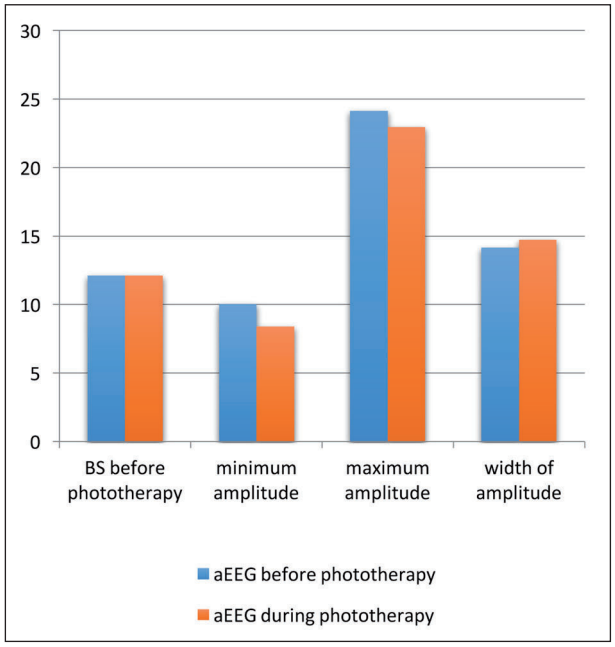

Figure 1 (ABS 34). Electrocortical brain activity before and during phototherapy in term newborns measured by amplitude-integrated electroencephalography (aEEG) – pilot study.
BS: Burdjalov score.

be assumed that phototherapy can affect the electrocortical activity of brain. We observed a decrease in electrical activity during phototherapy. For the final evaluation we need to provide a higher number of measurements.

ABS 35

FINLA DISEASE (FIBROSIS, NEURODEGENERATION AND LEPTOMENINGEAL ANGIOMATOSIS) CAUSED BY DELETERIOUS MUTATIONS IN THE *NHLRC2* GENE

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BACKGROUND
Discoveries of recessive mutations as causes of familial multiorgan diseases have provided molecular basis of an increasing number diseases and tools to study novel cellular pathways underlying their pathogenesis.

METHODS
Clinical and histopathological findings were observed from two unrelated families with three affected cases suffering from novel, fatal cerebropulmonary disease with multiorgan manifestations. Whole-exome sequencing of nine family members was performed. The expression of protein and mRNA of *NHLRC2* gene encoding a thioredoxin-domain containing protein was studied from the autopsy and *in vitro* in fibroblasts. Enzyme assays on thioredoxin activity were measured from the full-length human protein produced in *E. Coli*. After mating of heterozygous *NHLRC2* knockout mice, the survival of homozygotes was studied.

RESULTS
Neuropathology revealed increased angiomatosis-like, vacuolar degeneration and myelin loss of the white matter, and neuronal loss in the anterior horn of the spinal cord. Histopathology on lungs showed interstitial fibrosis and previously undescribed granuloma-like lesions. Exome sequencing revealed transmission of two deleterious mutations of the *NHLRC2* gene. The compound heterozygote mutations of *NHLRC2* led to an expression of mRNA with missense mutation and profound decrease in the amount of NHLRC2-protein expression in patients' fibroblasts. NHLRC2 is expressed in multiple healthy organs. Mice devoid of the conserved NHLRC2 fail to develop morula-stage and placentation. The pure NHLRC2-protein did not show significant thioredoxin activity in classical insulin-reduction activity assay.

CONCLUSIONS
We show that deleterious mutations of *NHLRC2*, a thioredoxin-domain containing protein, apparently without thioredoxin activity, causes an early-onset degenerative multiorgan disease named FINLA disease. *NHLRC2* is a lucrative candidate gene for other disease phenotypes, owing to its critical importance in early development.

ABS 36

HYDROCORTISONE SUPPLEMENTATION IN CIRCULATORY FAILURE OF COOLED ASPHYXIATED NEWBORNS

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INTRODUCTION

Relative adrenal insufficiency may contribute to refractory hypotension in asphyxiated newborns undergoing hypothermia. Low dose steroid therapy has previously been reported to be effective in similar critical conditions in infants. Therefore, our aim was to study baseline serum cortisol levels in asphyxiated, cooled newborns with systemic hypotension resistant to optimized pharmacological support and to demonstrate that hydrocortisone supplementation (HCS) restores normal blood pressure.

METHODS

In a retrospective cohort analysis, charts of 93 asphyxiated, cooled newborns (born between 2006 and 2015) who had refractory hypotension resistant to volume therapy and inotropic support were reviewed. Of the 93 patients, 28 received hydrocortisone (HCS group) as a rescue therapy based on the decision of the attending neonatologist, irrespective of actual cortisol levels. Hypotension was defined as a mean arterial blood pressure less than the gestational age in weeks at the time of birth.

RESULTS

Median serum cortisol level was 97 [60; 139] nmol/L (normal range is 110-276 nmol/L). Cortisol levels were lower in the HCS group (81 [53; 125.5] nmol/L) compared to the non-HCS group (122 [61.5; 262] nmol/L; $p = 0.036$). In the HCS group, hydrocortisone supplementation started at a median age of 47 [31-77] hours of life with an average dose of 0.68 ± 0.35 mg/kg. The median of initial mean arterial blood pressure was 37 [30-43] mmHg, one hour after HCS it increased significantly to 42.5 [37-50.5] mmHg, and 6 hours later it further increased to 47 [44-51.3] mmHg ($p < 0.001$).

CONCLUSIONS

Our results suggest that low serum cortisol may play a role in the refractory hypotension of cooled asphyxiated newborns and low dose hydrocortisone supplementation may improve the circulatory status of these infants. Based on this pilot data, we initiated a randomized, placebo-controlled trial to determine long-term safety and benefits of HCS.

ABS 37

INHALATIVE CO_2 FOR PREVENTING HYPOCAPNIA IN NEWBORNS WITH HYPOXIC-ISCHEMIC ENCEPHALOPATHY

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INTRODUCTION

Asphyxiated infants often develop hypocapnia due to hyperventilation driven by severe metabolic acidosis or vigorous mechanical ventilation. Hypocapnia has been consistently associated with adverse neurodevelopmental outcome in clinical trials. Thus, preventing hypocapnia is desirable in asphyxiated infants; however, currently no reliable technique is available to achieve this goal. Therefore, our aim is to test the feasibility and safety of low concentration of inhalative CO_2 gas mixture (5% CO_2 + 95% air) in maintaining pCO_2 levels in 40-60 mmHg range in asphyxiated, cooled, mechanically ventilated newborns.

METHODS

Term asphyxiated infants undergoing hypothermia treatment with a pCO_2 less than 40 mmHg within 6 hours of life will be enrolled. The 5% CO_2 gas mixture is administered through patient circuits in conventional ventilators. The end point of CO_2 inhalation is determined by recovery of metabolic acidosis, when base deficit has decreased below 5 mmol/L in the arterial blood. The maximum duration of CO_2 exposure is set at 12 hours. Continuous aEEG and NIRS are recorded and Doppler ultrasound measurements of cerebral blood flow in the anterior and medial cerebral artery are performed before and during treatment. A total number of 10 patients are planned to be recruited.

RESULTS

Preliminary results on the first 3 enrolled patients will be presented as part of data safety monitoring. The primary outcome is the percentage of time

spent in the desired pCO_2 range (40-60 mmHg) during CO_2 inhalation. The study is considered successful if in the intent-to-treat analysis the total time spent in desired pCO_2 range reaches 70% and no serious adverse effects are observed.

CONCLUSIONS

Inhalative administration of 5% CO_2 is a physiologically plausible intervention for preventing hypocapnia. If safety is proven, inhalative CO_2 may be used to optimize neuroprotection in asphyxiated newborns.

ABS 38

FLOPPY INFANTS: REPORT OF THREE CLINICAL CASES

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INTRODUCTION

The "floppy infant" is a well-recognized entity characterized by generalized hypotonia presenting at birth or in early life. Hypotonia represents a diagnostic challenge because it may be the presentation sign of numerous causes. Hypotonia may be due to central or peripheral nervous system abnormalities, myopathies, genetic disorders, endocrinopathies, metabolic diseases and acute/chronic illness.

CASE REPORT

We describe 3 male newborns term admitted in the first day of life for hypotonia and feeding difficulties. Pregnancy and familiar history were normal. Clinical examination revealed marked global hypotonia, few active movements, weak cry, poor suck reflex, micrognathia, cryptorchidism, facial dysmorphic features: almond-shaped eyes with short palpebral fissures, narrow bifrontal diameter, short neck. Laboratory evaluations were normal. Brain ultrasound and magnetic resonance had no alterations. Cardiac and metabolic evaluations were irrelevant. Prader-Willi syndrome (PWS) was suspected and genetic evaluation was performed. The karyotype and methylation analysis specific for PWS confirmed the diagnosis. At last follow-up visit, these infants revealed delayed psychomotor development and anthropometric parameters surrounding the percentile 15-50.

DISCUSSION

PWS is a complex neurodevelopmental disorder that results from an abnormality in chromosome 15. Diagnosis is often delayed because clinical findings are relatively nonspecific and the dimorphism is often subtle. There is published consensus of clinical criteria for PWS diagnosis but genetic testing has become the standard. Treatment involves a multidisciplinary team with early global intervention.

CONCLUSIONS

PWS should be considered in the presence of newborn hypotonia, feeding difficulties and cryptorchidism, even in absence of typical facial features. Detecting PWS at neonatal age is important because it allows early intervention and better management of such infants.

ABS 39

PRONE VERSUS SUPINE POSITION FOR CEREBRAL REGIONAL TISSUE OXYGENATION IN PRETERM NEONATES UNDERGOING NON-INVASIVE VENTILATION

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INTRODUCTION

Prone position was found to improve oxygenation and pulmonary functions in neonates undergoing mechanical ventilation. However, how this improvement changes brain tissue oxygenation has not been studied. We aimed to investigate if prone position offers any benefit in terms of cerebral regional tissue oxygen saturation ($crSO_2$) and cerebral fractional tissue oxygen extraction (cFTOE) in preterm neonates during non-invasive ventilation.

METHODS

Preterm neonates < 37 weeks gestational age (GA) undergoing non-invasive ventilation were enrolled. Non-invasive ventilation was defined as nasal continued positive airway pressure or intermittent positive pressure ventilation via binasal prongs. Near infrared spectroscopy (INVOS®) was used to measure $crSO_2$. Monitoring was started when the infant was lying supine for at least 1 hour and continued at the

same body position at least for 1 hour. Later the infant was changed to prone position and monitored for additional 3 hours. Peripheral arterial oxygen saturation (SpO_2) was also monitored continuously. cFTOE was calculated from $crSO_2$ and SpO_2.

RESULTS

Mean GA and birth weight of the cohort (n = 30) were 30.5 ± 3.2 weeks and 1,438 ± 618 g, respectively. There were 13 females and 17 males (**Tab. 1**). Both SpO_2 ($p < 0.001$) and $crSO_2$ ($p < 0.001$) values were higher in prone position compared to supine position. cFTOE ($p < 0.001$) and respiratory rate ($p < 0.001$) were lower in prone position. Other vital signs and blood gas analysis results were similar in both positions (**Tab. 2**). We observed no apnea episodes in either position.

CONCLUSIONS

We observed that $crSO_2$ as well as SpO_2 and respiratory rate were better in prone position in preterm neonates undergoing non-invasive ventilation. Additionally, cFTOE – which shows the balance between cerebral oxygen delivery and cerebral oxygen consumption – was lower in prone position. Longer follow-up periods in prone position can be suggested during non-invasive ventilation in preterm neonates.

Table 1 (ABS 39). Demographic features of the patients (n = 30).

Gestational age, weeks	30.5 ± 3.2
Birth weight, g	1,438 ± 618
Gender (F/M)	13/17
Postnatal age, days	4.7 ± 4.4
Hemoglobin, g/dl	15.4 ± 2.1
Ventilation mode (nCPAP/nIPPV)	18/12
Fractional inspired oxygen (%)	30.9 ± 9.4

Table 2 (ABS 39). Vital signs, blood gases and NIRS (near-infrared spectroscopy) measurements in supine versus prone positions.

	Supine	Prone	p-value
Respiratory rate/min	57.69 ± 5.3	55.69 ± 9.5	< 0.001
Heart rate/min	146.9 ± 16.4	146.7 ± 13.8	0.597
Mean BP (mmHg)	48.3 ± 8.1	49.8 ± 6.9	0.203
pH	7.36 ± 0.59	7.22 ± 0.74	0.226
PCO_2	37.47 ± 5.56	37.14 ± 6.27	1
HCO_3	20.61 ± 2.52	20.9 ± 2.79	0.459
BE	4.23 ± 2.34	3.82 ± 2.21	0.399
SpO_2 (%)	96.1 ± 1.9	94.7 ± 2.2	< 0.001
$crSO_2$ (%)	81.4 ± 8.5	78.4 ± 8.5	< 0.001
cFTOE	0.153 ± 0.086	0.173 ± 0.087	< 0.001

BE: Base Excess; $crSO_2$: cerebral regional tissue oxygen saturation; cFTOE: cerebral fractional tissue oxygen extraction.