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Abstract book

ASSOCIATIONS BETWEEN BRAIN METABOLISM AND EXECUTIVE FUNCTION DEFICITS IN CHILDREN BORN VERY PRETERM

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Aims and Objectives Executive function deficits in very preterm-born (VPT) children have been linked to anatomical abnormalities in white matter and subcortical brain structures. However, to date it is not known whether alterations in brain metabolites are also associated with such deficits. This study aimed to compare brain metabolite ratios between VPT and term-born (TB) children and to explore their association with EF.

Materials and Methods A group of 79 VPT participants aged 8 to 13 years and 80 TB peers were assessed with a comprehensive battery of EF tasks. A composite score was calculated to reflect overall EF abilities. Cerebral metabolites were obtained from two voxels in the frontal WM and the basal ganglia/thalami, respectively, using proton magnetic spectroscopy (MRS). Metabolite concentration ratios to Creatine (Cr) were calculated for N-acetylaspartate (NAA), Choline containing compounds (Cho), Glutamate and Glutamine (Glx), and myo-Inositol (mI), and were correlated with EF performance using linear regression.

Results VPT children had significantly lower overall EF abilities while controlling for age at assessment, sex, socioeconomic status, and processing speed (ß = -0.21, p = .007; adjusted R2 = .53, p < .016) compared with TB peers. VPT children further had lower Glx/Cr (Mean difference of -5.91 %, p = .03) and higher Cho/Cr ratios (7.39 %, p = .01) in the frontal WM. Higher frontal Glx/Cr ratios were associated with better EF performance (ß = 0.16, p = .03; adjusted R2 = .53, p < .0001).

Conclusions Preterm birth is associated with long-term brain metabolite alterations in the frontal WM, partly explaining deficits in EF abilities.

EARLY ASSESSMENT OF SHIFT OF THE SPO2 VS. PIO2 CURVE PREDICTS BRONCHOPULMONARY DYSPLASIA IN EXTREMELY PRETERM INFANTS

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Aims and Objectives Rightward shift of the peripheral arterial oxygen saturation (SpO2) versus inspired oxygen pressure (PIO2) curve is a marker of pulmonary gas exchange. We have previously shown, that shift of the SpO2 versus PIO2 curve can be used for the assessment of bronchopulmonary dysplasia (BPD) severity in preterm infants at 36 weeks (w) postmenstrual age (PMA). We hypothesised that rightward shift of the SpO2 versus PIO2 curve assessed in the first weeks of life is a predictor of BPD at 36 w PMA.

Materials and Methods This was a prospective observational study. We enrolled infants born at < 28 w gestation at the King Edward Memorial Hospital in Western Australia between 21st August 2017 – 1st April 2018. Rightward shift of the SpO2 versus PIO2 curve was assessed weekly from birth until 36 w PMA by recording SpO2 and PIO2 at hourly intervals for 24 hours. Right shift was calculated from the paired SpO2 versus PIO2 values using a validated prediction table.

Results 32 extremely preterm infants with a median (range) gestational age of 26.4 (23.9–28.0) w were studied. Shift values in infants with BPD were significantly higher compared to infants without BPD throughout the first eight weeks of life (all p <= 0.001, Mann-Whitney U tests). Receiver operating characteristic curve showed a shift value of 13.3 kPa at one week of age predicts BPD with 73.7 % sensitivity and 92.3 % specificity (AUC :0.85, p = 0.001). A shift value of 14.3 kPa at one week of life predicts moderate and severe BPD at 36w PMA with 66.7 % sensitivity and 78.3 % specificity (AUC :0.76, p = 0.026).

Conclusions Shift assessed at one week of age enables prediction of BPD at 36 weeks PMA. Prediction of moderate and severe BPD should be treated with caution for the limited number of infants included in the study. Nevertheless, infants with high shift values at one week of age are at risk of moderate to severe BPD. Early detection of preterm infants at risk for the development of BPD might benefit from targeted early interventions.

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Music in preterm infants enhances maturation of neural pathways involved in emotion Processing

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Background and aims Prematurity disrupts brain maturation by exposing the developing brain to different noxious stimuli present in the neonatal intensive care unit and depriving it from meaningful sensory inputs during a critical period of brain development, what can be associated with later neurodevelopmental impairments.

Musicotherapy has been used as an approach for meaningful sensory stimulation, relevant for activity-dependent brain plasticity and might influence networks formed early in development and affected by prematurity.

Using multi-modal Magnetic Resonance Imaging (MRI), we aimed to study the impact of a music intervention on premature infants' structural brain development.

Center-specific Differences in shoRt-term outcome indicators in neonates with hypoxic-ischemic encephalopathy

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Aims and objectives To investigate center-specific short-term outcome indicators such as hypotension, seizures, infection and mortality during therapeutic hypothermia until discharge from NICU in (near) term neonates with hypoxic-ischemic encephalopathy (HIE) registered in the Swiss Asphyxia and Cooling Register between 2011 and 2018.

Materials and methods Retrospective analysis of prospectively collected national register data between January 01st, 2011 and December 31st, 2018. Pregnancy, maternal, delivery and neonatal characteristics were compared between the cooling centers. Four short-term outcome quality indicators were defined as per Donabedian[1]: hypotension, seizures, infection, and mortality. Definitions of the outcome indicators as stated in the Swiss Asphyxia and Cooling Register were applied[2]. Descriptive analyses of the de-identified center to center analysis were performed and standardized observed to expected values (risk adjusted for male sex, small for gestational age, Sarnat score on admission, pregnancy/delivery complications) of each center with the entire network were compared using indirectly standardized mortality/morbidity ratio charts.

Results 570 neonates with HIE receiving therapeutic hypothermia in ten different cooling centers were included. Hypotension occurred between 30 % and 90 % of the cases, with a mean prevalence of 62 %. Clinical or subclinical seizures were reported in 17 % to 49 %, mean 32 %. Infection rates varied between 0 % and 31 %, mean 10 %. Neonatal deaths did not occur in one center and reached up to 25 % in other cooling centers, mean mortality was 14 %.

Conclusions Short-term outcomes of hypotension, seizures, infection and mortality showed significant differences between the cooling centers. Mean incidences of the reported short-term outcomes are comparable to Dutch[3] and British[4] cohorts of neonates with HIE receiving therapeutic hypothermia. This data will help us to establish benchmarks for the assessed outcome measures. Benchmarking is a continuous need with the ultimate goal to improve modifiable short-term outcomes in neonates with HIE.

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3 Diederen CMJ, van Bel F, Groenendaal F. Complications During Therapeutic Hypothermia After Perinatal Asphyxia: A Comparison with Trial Data. Ther Hypothermia Temp Manag. 2018.
4 Azzopardi D, Strohm B, Linsell L, Hobson A, Juszczak E, Kurinczuk JJ, et al. Implementation and conduct of therapeutic hypothermia for perinatal asphyxial encephalopathy in the UK--analysis of national data. PLoS One. 2012;7:e38504.

REDUCED FEELINGS OF SELF-EFFICACY IN PARENTS OF LATE-PRETERM CHILDREN

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Background The number of preterm children is high and affects about 5-10 % of all pregnancies. However, it is still unclear how a premature child affects the parents' quality of life and feelings of self-efficacy.

Aim Aim of this project is to evaluate the health-related quality of life and self-efficacy of parents of term (gestational age ≥ 37 weeks) versus late preterm children (gestational age 34-36 weeks). We aimed at detecting potential protective and/or harmful factors which might impact on the families.

Material and methods Mothers and fathers completed a standardized questionnaire during the first week of life of their newborn child. This questionnaire includes 47 questions which cover the assessment of the quality of life (short form 12), anxiety and depression (Edinburgh postnatal Depression Scale), couple satisfaction (CSI) and parental self-efficacy (Tool to Measure Parental Self Efficacy, TOPSE). Assuming normal distributions within each group, we compared them with the aid of analysis of variance and Bonferroni's post-hoc testing.

Results Since 2018, we were able to recruit parents of 135 term and 21 late preterm children. As expected, late preterm children weighted less than their term counterparts (2,6kg ± 430g versus 3,3kg ± 400g) and stayed about 2-3 days longer in the hospital (6.4 ± 2.8 versus 4.3 ± 1.4). Both groups were mainly treated in the maternity ward. It became clear that parents of late preterm children experienced less self-efficacy with lower TOPSE scores (228 ± 30) compared to parents with term children (247.8 ± 23.7), p<0.0001. The total score for health-related quality of life (SF12) was also lower (63.5 ± 18.7) compared to parents of term children (72.5 ± 16), but not significant p = 0.07. We could not detect significant differences concerning anxiety and depression or couple satisfaction.

Conclusions The fact that children are born preterm significantly affects parental self-esteem in terms of self-efficacy. Even if the clinical course is uncomplicated, the care team should take this fact into account. Anxiety, depression or couple satisfaction does not seem to play a major role. Future research should focus on investigating how long these differences remain and whether the support of parental self-efficacy is helpful.

Perinatal Palliative Care Services and Needs of Health Care Professionals Working in Swiss Perinatal Centres – A Nationwide Survey

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Aims and objectives While there is a body of knowledge about key elements of perinatal palliative care (PC), evidence shows the variation in the application of PC for this patient group. Many recommendations advise what health care professionals (HCPs) should do, but there is little data on how HCPs actually proceed in perinatal PC. It is, therefore, the goal of this study to evaluate perinatal PC in nine Swiss perinatal centres by examining its services in order to assess utilization, satisfaction, and needs for improvement.

Methods All HCPs (physicians, nurses and psychosocial staff members) working in the nine level III NICUs in Switzerland were asked to participate in an anonymous online survey.

Results A majority of HCPs (81.5 %) had treated a neonate with a palliative diagnosis in the last 12 months, with an average of 1-5 neonates (50.9 %) per year. More than half (51.6 %) reported to have a perinatal PC guideline at their institution, whereas 22.5 % were not aware of such guidelines, and 25.9 % reported the absence of guidelines. Overall, a large majority of HCPs without or unaware of perinatal PC guidelines at their institution expressed the need for one (90.2 %). Interestingly, HCPs were more satisfied with the provided PC in their institution when a PC guideline was present (p<0.05). HCPs working in the German speaking area of Switzerland more often reported having available guidelines than in the French speaking area (p<0.05). Mainly physicians reported not having perinatal PC guidelines at site in comparison to nurses or psychosocial staff members (p<0.05). Furthermore, one-third of HCPs (37 %) reported that further education in perinatal PC was offered at their institution, one-third (32.8 %) reported it was not, and another third (30.2 %) was unaware. Further education was more commonly offered in German speaking area (p<0.05). Overall, a large majority of HCPs (94.2 %) expressed the need to receive further perinatal PC education.

Conclusions In this study, we have taken a first step in gathering national data on the services and needs regarding perinatal PC of HCPs working in Swiss perinatal centres. Our findings show gaps in the availability of perinatal PC guidelines and further PC education. More importantly, perinatal centres in possession of guidelines report greater satisfaction with PC in their institution. The gathered knowledge in this survey can undergird national clinical guidelines, so that families could benefit from consistent care as well as strengthen perinatal PC nationwide.

PLASMA MR-PRO-ATRIAL NATRIURETIC PEPTIDE AND CT-PRO-ENDOTHELIN-1 IS ASSOCIATED WITH RESPIRATORY MORBIDITY IN VERY PRETERM INFANTS

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Aims and objectives Bronchopulmonary dysplasia (BPD) is a major complication of preterm birth and associated with increased morbidity and mortality. Early prediction of BPD based solely on clinical parameters is difficult. The aim of this study was to investigate the role of MR-pro-Atrial Natriuretic Peptide (MR-proANP) and CT-pro-Endothelin-1 (CT-proET1) as markers of respiratory morbidity in very preterm infants. Our objectives were to determine the association of biomarker levels at the age of 1 week with the duration of supplemental oxygen as well as with the composite outcome of BPD or death.

Materials and methods A prospective, observational, two centre cohort study (Clinical Trials Identifier: NCT02083562) was performed at two neonatal tertiary level care units (Basel and Berne). Preterm infants <32 weeks GA were eligible for this study. BPD was defined as need for supplemental oxygen at 36 weeks GA. MR-pro-ANP and CT-proET-1 levels were analysed from blood samples taken at day 7 of life (±2 days) by automated immunofluorescent assays (BRAHMS Biomarkers, Thermo Scientific, Henningsdorf, Germany).

Results A total of 229 preterm infants were included into the study (median [IQR] GA and birth weight were 29.6 weeks [29.0-30.7 weeks] and 1150g [840-1410g], respectively. Regression analysis revealed an association between MR-proANP and the duration of supplemental oxygen (p<0.001) as well as with the composite outcome BPD/death (p<0.001). CT-proET-1 levels were similarly associated with the duration of supplemental oxygen (p<0.001) and with the composite outcome BPD/death (p=0.034). The predictive abilities of MR-proANP and CT-proET-1 for BPD/death calculated as area under the ROC curve (AUC) were 0.752 (95 %CI 0.647-0.857) and 0.601 (95 %CI 0.496-0.706), respectively.

Conclusions MR-proANP and CT-proET-1 levels on day 7 of life are associated with the duration of supplemental oxygen and the composite outcome of BPD or death in very preterm infants. MR-proANP showed better a predictive ability than CT-proET-1. Combination of biomarkers with clinical parameters might facilitate BPD prediction and lead to improved clinical care of high-risk infants.

PHYSICAL ACTIVITY PROGRAMS FOR PROMOTING BONE MINERALIZATION AND GROWTH IN PRETERM INFANTS

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Aims and objectives Lack of physical stimulation may contribute to metabolic bone disease of preterm infants, resulting in poor bone mineralization and growth. Physical activity programs combined with adequate nutrition might help to promote bone mineralization and growth.

The primary objective was to assess whether physical activity programs in preterm infants improve bone mineralization and growth and reduce the risk of fracture. The secondary objectives included length of hospital stay, skeletal deformities, neurodevelopmental outcomes, and adverse events.

This is an update of the review first published in the Cochrane Database of Systematic Reviews 2007.

Methods We used the standard search strategy of Cochrane Neonatal to search the Cochrane Central Register of Controlled Trials, MEDLINE, EMBASE, and CINAHL. We also searched clinical trials databases, conference proceedings, and the reference lists.

Data collection, study selection, and data analysis were performed according to the methods of the CNRG.

Selection criteria RCTs and quasi-RCTs comparing physical activity programs versus no organized physical activity programs in preterm infants.

Results Sixteen trials enrolling 496 preterm infants were included in this review. Methodological quality and reporting of included trials were variable.

Four trials demonstrated moderate short-term benefits of physical activity for bone mineralization. The only trial assessing long-term effects on bone mineralization showed no effect of physical activity administered during initial hospitalization on bone mineralization at 12 months corrected age. Meta-analysis from four trials demonstrated a positive effect on daily weight gain (WMD 1.90 g/kg/d, 95 % CI 0.98 to 3.19). Data from five trials showed no effect on linear or head growth. Three trials reported on fractures (this outcome occurred in one patient in the control group) and complications of preterm birth (no significant differences between both groups).

Conclusions Some evidence suggests that physical activity programs might promote short-term weight gain and bone mineralization in preterm infants. Data are inadequate to allow assessment of harm or long-term effects. Current evidence does not support the routine use of physical activity programs in preterm infants. Further trials incorporating infants with a high baseline risk of osteopenia are required. These trials should address adverse events, long-term outcomes, and the effects of nutritional intake.

Born too soon – (re)acting too soon? Inhibition abilities in very preterm-born children

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Aims and objectives Children born very preterm often show impaired executive functions, of which inhibition abilities form an elemental component. Inhibition abilities are considered to be strong predictors of social adjustment, emotional regulation, and long-term academic achievement. The current study aimed to investigate whether inhibition abilities in school-aged VPT children are impaired compared to term-born peers.

Materials and methods A group of 67 VPT participants aged 8 to 13 years and 70 term-born (TB) peers completed two inhibition tasks, namely, a Stop Signal Task and the Colour-Word Interference Test. A composite score was calculated to reflect overall inhibition abilities. Using linear regression, the effect of preterm birth on inhibition abilities was quantified.

Results On average, the completion time of children born very preterm for inhibition tasks (M = 0.39, SD = 0.81) was 0.38 SD slower than their term-born peers' completion time for inhibition tasks (M = 0.01, SD = 0.78). Differences in overall inhibition abilities were not significantly explained by preterm birth when adjusting for age at assessment, sex, and socioeconomic status (ß = 0.13, 95 %-CI [-0.04, 0.30], p = .14; adjusted R2 = .19, p < .001).

Conclusions Children born very preterm performed lower on inhibition tasks than term-born peers. These differences were not explained by preterm birth when adjusting for potential confounders. In a further step, we aim to investigate whether inhibition performance is associated with whole-brain structural brain connectivity.

CHARACTERIZATION OF THE ACOUSTIC ENVIRONMENT IN A NEONATAL INTENSIVE CARE UNIT

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Background Little attention has been paid to the auditory surrounding of premature babies in the neonatal intensive care unit (NICU), although environmental noise is a risk factor for worse neurological outcome[1].

Aim Aim of this project is to characterize the acoustic environment of a premature baby in a NICU and to measure environmental noise in the immediate surrounding of the premature infant

Methods We recorded sound in and outside an empty incubator "GE Giraffe, Omnibed", which was switched on. This approach allowed us to characterize the frequency response of the incubator and to assess the acoustic environment of the NICU as heard by staff and by a premature child.

Results The average sound pressure level during acoustic evaluation within the NICU was 51.2dB with a sound level exceeding 59.3dB 10 % of the time and a maximum peak of 75.2dB. During a 7- hour recording (10am to 5pm), we detected 162 peak events beyond 73dB(C) corresponding to one event every 2-3 minutes. Opening and closing of the cabinet's doors were one major source of those transient noises.

The incubator provides a noise floor of 40.4dB(A) SPL within a frequency range of 1300-1500Hz originating from the fan inside the incubator. The maximum sound level was 73.7dB(A). The smoothen frequency response slope decreases from 80Hz to 500Hz with approx. 20dB/decade. A plateau from 500Hz to 4kHz dampens the exterior sound by -20dB, followed by a decrease of 12dB/decade until 16kHz. The incubator presents strong (+15dB) resonance frequencies between 600Hz and 1kHz, which distort the acoustics.

Conclusions Preterm infants are exposed to considerable high and diffuse basal acoustic stimuli. Our results suggest that the acoustic environment of premature infants can and should be improved. New recommendations should include a definition of noise which could be adapted to the measured quality of the acoustic environment. The ultimate goal would be to balance the sounds and to shape the preterm acoustic environment according to their needs.

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DETECTION OF MOLECULAR MECHANISMS IN RESPONSE TO HYPOXIA AND STARVATION IN PLACENTAL CELLS

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Aims and objectives If a placenta cannot fully guarantee the supply of nutrients and oxygen, the development of the fetus will be impaired. This situation is called "placental insufficiency", finally leading to intrauterine growth restriction (IUGR). The exact mechanism behind this disease is still unknown. This project aims at the detection of molecular mechanisms in response to hypoxia and starvation of placental cells.

Materials and methods Immortalized placental cells (JEG-3 and JAR) were exposed to hypoxia (0.2 % of oxygen) or room air (21 % of oxgen) and/or starvation (glucose free medium) for time periods between 4 and 48 hours and then assessed for viability, DNA- and protein content. In addition, vascular endothelial growth factor (VEGF) and interleukin 6 (IL-6) were analyzed with the aid of enzyme linked immune-absorbant assays. Effect sizes between the groups were compared using One-Way ANOVA and Tukeys post-hoc correction.

Results Hypoxia alone did not reduce viability or DNA content neither in JEG-3 nor in JAR cells, but hypoxia in combination with starvation led to an additional mean reduction in viability by 60-80 % (p <0.01) after 12-24 hours. Additionally, a reduction of DNA content of more than 50 % was visible (p<0.05). Likewise, the protein content per plate was significantly reduced after 24 hours. These effects could not be attributed to increased levels of VEGF or IL6 in the cellular supernatant.

Conclusions Glucose starvation affects cellular viability, DNA and protein content of JAR and JEG-3 cells in combination with hypoxia. In a next step we plan to address different types of placental cell death (necrosis, apoptosis and autophagy) and compare these results to data from human tissue samples.

First report of a neonate girl with an imperforate hymen and congenital urethrovaginal fistula - A case report and discussion about neonatal management and complications

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Background In antenatal, respectively neonatal period, the diagnosis of imperforate hymen is rare and usually made due to the consecutively occurring mucocolpos. Standard management consists of incision in the neonatal, oestrogenised period or delayed in puberty before menarche. In patients with consecutively impaired renal, bladder, and bowel function, immediate sonographic evaluation and incision is recommended.

Case We present the case of a term born girl with antenatally suspected mucocolpos. Birth and postnatal adaptation including micturition were uneventful. At 5 days of life, she developed a distended, bluish discolored abdomen with urinary retention. External genital examination showed an imperforate hymen. A Foley catheter was placed and urine was drained, but without clinical improvement. Using Credé maneuver, the hymen was bulging, but additionally, bloody fluid drained out of the urethra beside the urine catheter. Transabdominal ultrasound revealed a large hydrometrocolpos and the transurethral urine catheter correctly placed in the bladder. Additionally, bilateral hydronephrosis was evident.

The patient was immediately brought to the operation room for exploration and surgical treatment. A cruciate hymenectomy was performed, with drainage of 20ml of bloody fluid. Further examination with videoscopy revealed a congenital urethrovaginal fistula.

The postoperative course was uneventful with complete regression of the bilateral hydronephrosis and ongoing patency of the hymen, as well as normal urination.

Summary and conclusion To our knowledge, this is the first reported case of a neonate with congenital urethrovaginal fistula in addition to an imperforate hymen. Five cases are described in the literature, but all of adult women.

Most neonates with imperforate hymen are asymptomatic, but it is important to diagnose and closely monitor these patients in order to avoid complications. Imaging is recommended to rule out any associated nephro-uro-genital malformations. Hymenectomy should be performed under sterile conditions.

LARGE CONGENITAL HEMANGIOMA CAUSING SIGNIFICANT CARDIAC AND RESPIRATORY INSUFFICIENCY

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Introduction Congenital Hemangiomas (CH) are a group of benign vascular tumors arising prenatally and presenting at birth formerly divided into two subtypes RICH and NICH based on clinical behavior (rapidly involuting, within 12-24 months or noninvoluting). Due to a subgroup that begins as a RICH but fails to completely involute a third subtype called PICH (partially involuting) has been defined.

Clinical presentations at birth are solitary lesions with predilection for the head, neck or limbs without postnatal growth. The diagnostic criteria is full presence at time of birth and activating mutations in GNAQ and GNA11 in skin biopsy. Complications include ulceration, thrombocytopenia and high output heart failure due to the high blood flow in the lesion. Therapy is indicated according to complications.

Case report A newborn boy was admitted to our hospital with congenital hemangioma and high flow shunt in the right cervicothoracic and parietal region. The lesion was already known from prenatal ultrasound and closely monitored for signs of heart failure after the fetal MRI presenting the high flow lesion. Severe coagulopathy and high output cardiac failure were therefore expected.

After birth by elective caesarean section he presented initially with mild clinical signs of cardiorespiratory insufficiency and support by CPAP was initiated. Echocardiography showed a dilated right ventricle with impaired function due to the high output cardiac failure. Coagulopathy was not found. Yet, the patient progressively developed cardiac insufficiency within the first days and invasive respiratory as well as inotropic therapy with milrinone became necessary. Further radiological and genetic examination was pushed. Postnatal MRI confirmed the vascular high flow tumor with vascular supply originating from the right common and external carotid artery and partly the right subclavian artery.

Skin biopsy showed a benign vascular tumor negative for GLUT 1, but an activating punctual mutation on GNAQ Exon 5.

Because of size and severe heart insufficiency a first line therapy with Sirolimus was administered, followed by percutan transarterial embolization of the high-flow lesion via a direct puncture of the right carotid commune artery. Solely particles were injected through a microcatheter close to the nidus (Embosphere, 500 - 700 µm).

This led to embolization of 30-40 % vascular supply of the tumor. After this intervention, the patient showed an impressive improvement. Extubation and afterwards weaning from CPAP was possible within two days. Discharge from hospital with a regressed vascular lesion followed after one month of hospitalization. With the clinical context and the genetic results, we assume the lesion to be part of the PICH spectrum. Follow-up is ongoing and shows further but slow regression of the lesion and improvement of the cardiac ventricular hypertrophy. The next MRI is planned at the age of 4 months.

Conclusion Congenital hemangiomas are benign vascular tumors fully developed at birth. Three subtypes are known.

Knowledge of severe possible complications i.e. high output cardiac failure mandates close prenatal monitoring. Full diagnostic work up including skin biopsy and imaging studies postnatally should be performed urgently to allow early treatment.

Intravascular embolization of the nidus of a high-flow lesion should be evaluated in case of signs of heart insufficiency.

AN UNUSUAL CAUSE OF HYDROPS FETALIS

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Hydrops fetalis (HF) is an abnormal accumulation of fluid in two or more fetal compartments that may result from various etiologies with a high risk of perinatal mortality.

We present here an unusual cause of HF in a male baby, born to a G1 P0 32 year-old female. A threatened preterm labour at 30 weeks of gestation (GA) motivated a course of steroids. At 34.3 GA, membranes ruptured and fetal movements decreased. The ultrasound (US) showed fetal ascites with pericardial effusion and fetal distress (Manning index at 2/10). Emergent cesarean section was performed. Apgar was 5/9/9, cord pHa/v 7.12/7.2. The baby was hypotonic, apneic and bradycardic. He was stimulated, bag mask ventilated for 2 minutes, then put on CPAP for respiratory distress. A central venous umbilical catheter was inserted. Oxygen requirements increased up to 80 %, motivating intubation at 3 hours of life (HoL). A paracentesis drew 80 ml of ascites, compatible with a transudate. The baby was eutrophic (BW 2500g); except for ascites, hepatomegaly and cardiomegaly, the clinical examination was normal. Cardiac US performed at 2 HoL showed severe right systolic dysfunction with high pulmonary pressures. Ductus arteriosus was closed and a thrombus was present in the left pulmonary artery, extending to the pulmonary trunk: a CT scan performed at 12 HoL confirmed this finding. Despite therapeutic anticoagulation with continuous intravenous heparin, initiated at 14 HoL, the thrombus progressed with persistent hemodynamic instability. Surgical thrombectomy with cardiopulmonary bypass was thus performed at day of life (DOL) 3, without complications. Direct intra-operative examination, CT scan and clinical evolution suggested an aneurismal origin of the ductus favouring thrombosis. Coagulation and metabolic workup were normal for age and placental histology unremarkable. We found no signs of anemia, hemolysis, TORSCH infection nor maternal thyroid dysfunction. Cerebral and abdominal US were normal. Evolution was favourable; the baby was discharged at DOL 53 with an anticoagulation treatment for 3 months. Thrive and development were normal at 12 months. No further treatment was needed.

As far as we know, aneurysm leading to prenatal closure of the ductus, right cardiac dysfunction and life-threatening fetal hydrops has been poorly described in the literature. In this case, early echocardiographic diagnosis and cardiac surgery allowed timely thrombectomy and full recovery.

NEONATAL ALLOIMMUNE THROMBOCYTOPENIA AND ENTEROVIRUS MENINGITIS- AN UNUSUAL COMBINATION

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Introduction Neonatal alloimmune thrombocytopenia (NAIT) is a rare disease of newborns. It is caused by transplacental passage of maternal platelet-specific alloantibodies. We demonstrate a case of a newborn boy who initially presented with a neonatal infection. A severe decrease of platelet count was found coincidentally.

Case report A late preterm boy (36 6/7 weeks of gestation, birth weight 3050g) presented at day four of life with irritability, temperature up to 37,9 °C, lethargy , and extended recapillarisation. We suspected a late-onset infection and started intravenous antibiotics. The laboratory results showed a CRP of 17 mg/l, a neutrophil left shift of normal white blood count, and a platelet count of 166/nL. Enterovirus was confirmed positive in lumbal puncture the following day, but in addition, petechiae were observed in the back of the infant, and platelets dropped to 15/nL. Four platelete concentrates were transfused for treatment of recurrent thrombocytopenia between the fifth to seventh day of life. No intracranial bleeding was observed in transfontanellar ultrasound. Maternal immune thrombocytopenic purpura (ITP) was excluded through a normal platelet count of the mother. NAIT was subsequently diagnosed with a rare combination of maternal antibodies against Anti-HPA-1b and Anti-HLA-A2. After two administrations of intravenous immunoglobulins, the platelet count increased spontaneously and transfusion of typed platelet concentrates were not necessary. The general condition of the boy improved under symptomatic treatment of enteroviral meningitis.

Discussion In this case report we demonstrate a rare combination of neonatal enterovirus meningitis and NAIT. Enterovirus meningitis can explain a mild decrease of platelets but not a severe thrombocytopenia as seen in infant with NAIT. Antibodies are mainly directed against human platelet antigens (HPA), which are expressed by platelets. The combination of antibodies against both HPA and HLA antigens is very rare. Thrombocyte concentrates can be typed for HPA and HLA genotypes to select individual antigen negative platelets for transfusion.

Conclusion Diagnostic tests for NAIT should be performed in thrombocytopenic newborns with neonatal infection, when thrombocytopenia is severe and requires repetitive transfusions of platelets.

For subsequent pregnancies, the parents should be advised by a hematologist.

KARDIORESPIRATORISCHE EREIGNISSE NACH GRUNDIMMUNISIERUNG VON EXTREMFRÜHGEBORENEN

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Hintergrund Extremfrühgeborene leiden an einem erhöhten Risiko für Infektionen und schwerwiegende Verläufe von Kinderkrankheiten, das heutzutage durch Impfungen reduziert werden kann[1]. Die Erstimpfung der dreiteiligen Grundimmunisierung führt bei bis zu 50 % der Patienten zu kardiorespiratorischen Reaktionen mit Apnoen und Bradykardien[2]. Basierend auf dieser Problemstellung stellt sich die Frage, wie häufig die wiederholte Impfung bei Frühgeborenen <28. Schwangerschaftswoche aufgrund von vermehrten kardiorespiratorischen Ereignissen im stationären Rahmen stattfinde und welche Faktoren mit einer ausgeprägten Impfreaktion assoziiert sind.

Methode Retrospektive Studie aller Extremfrühgeborenen, die zwischen 2012 und 2016 auf der Neonatologie am UniversitätsSpital Zürich hospitalisiert waren und grundimmunisiert wurden. Die Impfreaktionen einschliesslich erforderlicher therapeutischer Massnahmen innerhalb der ersten 24 Stunden nach Impfung und assoziierte Risikofaktoren wurden erfasst. Im klinischen Alltag wird aufgrund der Impfreaktionen entschieden, inwieweit die Folgeimpfung ambulant oder stationär durchzuführen ist.

Ergebnisse Nach der ersten Impfung reagierten 52.8 % der Extremfrühgeborenen (N=86), nach der zweiten Impfung 30.6 % (N=33) und nach der dritten Impfung 7.7 % (N=3). Die Empfehlung zu einer stationären Impfung war bei der ersten Impfung zu 99.6 %, bei der zweiten Impfung zu 69.1 % und bei der dritten Impfung zu 25 %. Risikofaktoren, die mit erhöhten Impfreaktionen einhergingen, waren das postmenstruelle Alter, das Geburtsgewicht (insbesondere <1000g) Länge der Koffeinzitratgabe und bronchopulmonale Dysplasien, die Länge der Sauerstoffgabe, und die Hospitalisationsdauer.

Schlussfolgerung Impfreaktionen auf die Erstimpfung sind häufig und nehmen mit Zweit- und Drittimpfung ab. Die gegenwärtige Praxis zur stationären Überwachung war in unserer Klinik grosszügiger bemessen als es die systematische Erfassung der Impfreaktionen nahelegt. Anhand der Studienergebnisse planen wir, ein genaueres Risikoprofil zu erstellen und die Empfehlungen für die Notwendigkeit der stationären Impfung zu optimieren.

1 Shinefield H, Black S, Ray P, et al. Efficacy, immunogenicity and safety of heptavalent pneumococcal conjugate vaccine in low birth weight and preterm infants. Pediatr Infect Dis J. 2002 Mar;21(3):182-6.

2 Flatz-Jequier A, Posfay-Barbe KM, et al. Recurrence of cardiorespiratory events following repeat DTaP-based combined immunization in very low birth weight premature infants. J Pediatr. 2008 Sep;153(3):429-31.

Early onset neonatal sepsis in africa - alarming results from a systematic review and metanalysis

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Aims and Objectives Of all 2.5 million neonatal deaths per year, roughly 40 % occur in Sub-Saharan Africa, and one-quarter is due to infection. Neonatal Early Onset Sepsis (EOS) occurs in the first days of life through maternal genitourinary and faecal colonization. Historically, primary neonatal pathogens in EOS are Group B streptococcus, Listeria monocytogenes, and enterobacteria; therefore, empirical EOS treatment with ampicillin and gentamicin targets these bacteria. The African bacterial prevalence in EOS is not yet well established but reports claim germs differing from high-income countries and increasing resistances.

Materials and Methods We searched Pubmed, EMBASE and Web of Science without language restrictions for any type of study published between 01.01.2000 and 22.07.2019 that investigated EOS, neonatal colonization, maternal colonization, maternal infection and antibiotic resistance in Africa. A systematic review and metanalysis investigated the most prevalent bacteria and the likelihood of resistance to commonly used antibiotics in EOS.

Results From 1184 retrieved titles for the outcome 'neonatal nepsis', 20 papers had exploitable information. We noted that Pseudomonas aeruginosa prevalence increased progressively from 5 % in 2010 to 15 % in 2018. The year of publication explained 70.2 % of the EOS prevalence variance ($p<0.01$).

Conclusion Empiric primary treatment of EOS with Ampicillin and Gentamicin is based on historical bacterial ecology, while, these antibiotics do not cover Pseudomonas aeruginosa efficiently. The increase in Pseudomonas prevalence over time is alarming and may be responsible for a significant share of neonatal deaths in Africa.

When an elephant hides another one; a case report

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Introduction Inherited hematological disorders are rare in infancy and compared to acquired ones, they tend to have a hidden presentation.We present a case of a perfect example of the insidiousness of hemophilia A diagnosis in the newborn period.

Case presentation A term male infant, second child of unrelated parents, was born by vaginal delivery. There were no complications and the newborn was discharged at home after 48 hours. At the age of 26 days, he was referred to our neonatal intensive care unit because of an acute progressive flaccid paralysis of the lower limbs, developing over the last 24 hours. The medical examination confirmed signs of spinal compression, as well as a left thoracic paraspinal swelling of 10 x 3 cm.The family history was negative and the recent medical history revealed a non-traumatic lumbar puncture 11 days before, and in relation with a hospitalization for a RSV bronchiolitis. Emergency MRI showed an extensive spinal cord compression related to an acute epidural hematoma with active bleeding. Subcutaneous and muscular paraspinal hematoma was also seen. Urgent indication for surgery was decided, but coagulation tests were abnormal, showing prolongation of activated partial thromboplastin time (107 sec). Administration of fresh frozen plasma during the preoperative period was unsuccessful. A factor assay was performed and revealed a severe factor VIII deficiency (<1 %), confirming a classical hemophilia A. Substitution therapy was given and surgical evacuation of the epidural hematoma could be undergone 8 hours after admission when the clotting tests were normalized. The outcome was favorable and neurological symptoms regressed progressively.

Discussion An initial diagnosis of spinal cord compression after lumbar puncture may hide another underlying cause, such as hemophilia A in our case. Physicians should be aware of such rare bleeding disorders and must question bleeding after lumbar puncture. Clinical examination and adequate investigations must be prioritized, before MRI evaluation so that substitution treatment can be initiated immediately.

How confident do neonatologists feel in predicting the long-term prognosis of the extremely preterm children born <28 gestational weeks when discharging from the NICU?

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Aims and Objectives The birth of an extremely premature child is a profound experience for the parents. The neonatal course is often complicated and the stay at the neonatal intensive care unit is typically very stressful period. Fortunately, at approximately calculated term most of the children are ready to be discharged. Often the discharge planning will raise questions about the development of their child. For neonatologists these questions can be challenging. This study aims to investigate the knowledge and confidence of neonatologists regarding long-term neurodevelopmental outcome and their needs to improve knowledge.

Materials and Methods An online questionnaire was sent to all neonatologists of the nine level III Neonatology departments in Switzerland. Questions covered a range of topics including confidence in consulting parents, information sources used to predict long-term outcome and sources of information consulted. In addition, the questionnaire explored if neonatologist want to improve their knowledge.

Results 34 neonatologist answered the questionnaire. Out of the 34 participants, approximately 50 % consider their confidence in consulting parents on neurodevelopmental outcome at a medium level and 25 % indicate having little confidence in their counselling knowledge. Considering diagnostic tools to predict long-term outcome, the cMRI and the neurological examination at term age are the two methods most neonatologist would rely on, followed by using the results of the General Movements examination.

In terms of information sources used to predict long term-outcome, most participants referred to review articles and data from the SwissNeoNet. 65 % of the participating neonatologists would like to have a better knowledge regarding the long-term outcome of the preterm children. A better exchange between the neonatologist and other disciplines involved in the further medical care and an interdisciplinary follow-up consultation are suggested by participants, alongside a number of other suggestions.

Conclusion Prediction of the long-term neurodevelopment of the extremely preterm children remains challenging. Based of the results of the survey, the majority of Swiss neonatologists wish to gain a better knowledge and obtain more information about the long-term development of their little patients.

PROGNOSTIC VALUE OF PLACENTA PATHOLOGY IN NEONATES WITH HYPOXIC ISCHEMIC ENCEPHALOPATHY

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Aims and objectives Every year 4 million infants worldwide die of neonatal encephalopathy (NE). Although newborn infants with moderate and severe hypoxic ischemic encephalopathy (HIE) receive hypothermia therapy (HT), 40-50 % die or have significant neurological disability. Our aim was to analyse whether major placenta pathology is associated with unfavourable neurodevelopmental outcome in newborns with HIE at 18-24 months of age.

Materials and methods Prospectively collected data on 69 newborn infants registered in the Swiss National Asphyxia and Cooling Register between 2007 and 2017 have been retrospectively analysed. HT was applied according to national guidelines. 2 experienced pediatric pathologists assessed the placenta histology for major placenta pathology[1]. Standardized neurodevelopmental assessments were performed at 18-24 months. Unfavourable outcome was defined as death before 2 years of age as well as moderate or severe disability at follow-up examination at the age of 18-24 months.

Results 48 out of 69 newborn infants have a Sarnat Score 2 (33/48) or Sarnat Score 3 (15/48), all of which received HT and were included in further analysis. 12 out of 48 newborn infants died before the age of 2 years. 83 % of the survivors (30/36) were examined at 18-24 months of age. Major placenta pathology occurred in 20 (48 %) out of the 42 infants who were neurodevelopmentally assessed (12 deaths and 30 with follow-up visit). Major placenta pathology was associated with an odds ratio of 1.3 (95 % confidence interval 0.30-5.78) for an unfavourable outcome at 18-24 months and an odds ratio of 1.3 (95 % confidence interval 0.20-8.15) for death before 2 years of age.

Conclusion Even though not statistically significant, an odds ratio of 1.3 assumes a positive association of major placenta pathology and unfavourable outcome in newborn infants receiving HT. Further studies are needed in order to evaluate whether placenta pathology could be a useful biomarker for neurodevelopmental outcome. Additionally, it may contribute to the understanding of different pathophysiological mechanism leading to HIE as well as diverse therapeutic responses to HT.

1 Khong, 2016, Sampling and Definitions of Placental Lesions: Amsterdam Placental Workshop Group Consensus Statement

THE MILK GAP: CONTEXTUALIZING HUMAN MILK BANKING AND INFORMAL MILK SHARING PRACTICES AND PERCEPTIONS IN SWITZERLAND

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Aims and objectives Human milk banks (HMB) in Switzerland exclusively provide pasteurized donor human milk (DHM) to hospitalized infants. The 7 Swiss HMBs are located only in the German-speaking regions, which give rise to geographic, cultural and linguistic disparities to access safe DHM. In addition, despite the risks of mishandling, adulteration and pathogenic transmission, informal human milk sharing and selling online are rising in popularity and controversy. Limited evidence exists examining these practices and human milk markets in Switzerland. Therefore, the goal of the study is to uncover the current challenges faced by Swiss hospitals and to investigate the motivations, practices, and perceptions of mothers who have engaged in online milk sharing.

Material and methods Following the review of scientific literature on milk banking and milk sharing and selling in Europe, we interviewed 10 Swiss hospitals (6 with milk banks, 4 without milk banks) and 5 mothers who donated or received human milk through online social media networks. We evaluated online milk sharing and selling platforms and their security procedures.

Results Swiss HMBs are heterogeneous in practice and experience numerous challenges, e.g., high costs, inefficiency, low capacity and inconsistent stocks of DHM. Regarding informal milk sharing, online platforms were found to have no accountability nor hygienic procedures. We interviewed mothers from a milk sharing Facebook group, who only assumed positive intentions from other mothers and preferred untested and unpasteurized DHM to infant formula. Their safety and risk reduction practices were limited and variable.

Conclusions Currently, HMBs in Switzerland are not standardized nor equally accessible throughout the country. As human milk is unregulated and in demand, there is a rise of informal milk sharing among mothers. Maternal participants experienced systematic

barriers while pursuing their breastfeeding goals. Yet, found value through informal milk sharing networks. Overall, the lack of a legal framework, standardization, medical support and accessibility to safe DHM from HMBs presents numerous gaps, challenges, and growing concerns. Results from this study can support the development of public health interventions, clinical practices and policies that promote maternal and infant health and safety.

AN UNEXPECTED AND SEVERE COMPLICATION DUE TO A PRESUMED UMBILICAL VENOUS CATHETERISATION

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A female preterm infant was born to a 37 year old woman at 34+2 weeks of gestation. A caesarean section was performed because of vaginal bleeding and placenta praevia. The apgar scores were 5 and 7 at 1 and 5 minutes, respectively, and the birth weight was 2760g. She developed respiratory distress requiring continuous positive airway pressure and supplemental oxygen. A peripheral vascular access was not attempted, and the team proceeded to umbilical venous catheterisation. The infant was commenced on 10ml/h of dextrose10 %. An x-ray revealed that the presumed umbilical venous catheter (UVC) in fact was entering the umbilical artery with the tip of the catheter projected in the right external iliac artery. The catheter was immediately removed approximately 30 minutes after insertion. At this moment a livid discoloration of the gluteal region was noted, with some improvement, but not full resolution after removal of the catheter.

Over the next days the patient developed severe cutaneous and subcutaneous necrosis of the right gluteal region, requiring surgical debridement of necrotic tissue. She had no motor activity in the lower right extremity. A MRI on 13th day of life showed severe gluteal myonecrosis with some perfusion of gluteal, piriform and obturator muscles, and no perfusion of the right femoral head. The sciatic nerve was poorly depicted in the MRI, suggestive of necrotic injury. In the initial nerve conduction tests of right peroneal and tibial nerves, no action potential or muscle contraction could be detected.

The skin lesions healed well without need of skin grafting. The infant received physiotherapy and transcutaneous electric nerve stimulation (TENS) therapy. A follow up at 3 months of age showed neurophysiological and clinical improvement of innervation of the right lower extremity, and the sciatic nerve could now be visualized in the ultrasound exam. Also encouraging was the orthopaedic exam with symmetric growth of femoral heads confirmed by ultrasound, near-normal spontaneous flexion/extension of right hip and knee, but with a persisting droop foot still requiring therapy.

SEVERE REFRACTORY STATUS EPILEPTICUS IN A NEONATE

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Introduction Neonatal seizures are common with an incidence up to 3 per 1000 live births. The vast majority occurs on the first day of life and hypoxic ischaemic encephalopathy is the most common cause. We present the case of a term born female infant with left-sided hemimegalencephaly developing severe refractory status epilepticus.

Case presentation The patient was born to a 37 year old G4P3 mother at 37+6 weeks of gestation after an uncomplicated pregnancy. Adaptation was unremarkable and arterial umbilical cord pH value was 7.30. Birth weight 3080g, length 49.5cm and head circumference 35cm. Mother and infant were transferred to the postnatal ward. Three hours later the patient had a generalized seizure with cyanosis. One hour later she had a second seizure and a loading dose of phenobarbitone was given. She was transferred to the neonatal intensive ward. An amplitude integrated electroencephalography was installed and a cranial ultrasound was suggestive of left-sided hemimegalencephaly. A cerebral MRI on the next day confirmed the left-sided hemimegalencephaly, and also revealed one subependymal and one cortical tuber on the right. In combination with a retinal hamartoma and a positive family history the diagnosis of tuberous sclerosis was confirmed.

Over the next few days the patient developed a severe refractory status epilepticus not responding to conventional antiepileptic therapies. A trial of ketogenic diet was initiated at the age of three weeks. Due to hypoglycemia and vomiting ketosis was difficult to reach and so far did not lead to an obvious relief of symptoms. Currently the patient is still suffering from frequent seizures and is being evaluated for early antiepileptic surgery in form of hemispherectomy.

THE RED CODE – IMPROVING PATIENT SAFETY BY IMPLEMENTING A NEW CALL PROCEDURE FOR EMERGENCY LIFE-THREATENING CAESAREAN SECTION IN A NON TERTIARY CENTER

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Aims and objectives Emergency caesarean section requires in a very short time the involment of a multidisciplinary team in the operating room. To call and notify all team members that such procedure is needed, a clear announcement must be made, most often by multiple phone calls made by various staff members. We identified three recent situations in the institutional critical incident reporting system, highlighting missed calls and the team slow response time. No harm to the patients was reported, but concerns rose about potential future impacts. These situations were identified as critical and triggered a need for improvement in the call system for emergency caesarean to be safer and more efficient.

Materials and methods We have set up an interprofessional task force to work on a new institutional protocol to reduce the number of phone calls, ensure simultaneous transmission of information to the entire team, and accelerate its availability. Based on revised national guidelines published in 2017 and to avoid frequent misinterpretations of Lucas's emergency caesarean classification, a specific terminology was defined as " red code caesarean" for life threatening caesarean. A technical solution with a single alarm button has been built. The junior obstetrician following clear confirmation of the emergency caesarean indication by a senior obstetrician triggers off the red code button. The entire team is simultaneously called by means of an audible and text alarm on the hospital phone devices, and must go immediately to the operating room. Such life-threatening situation is a rare event. In order to ensure the proper functioning of the alarm on all phone devices, monthly check test are carried out, providing an opportunity to remind team members of the process.

Results The RED CODE protocol was introduced in our non-tertiary hospital in February 2019. Over a 9 months period, the red code button was pushed 6 times out of a total of 380 deliveries. No incident was reported nor through monthly test checks. Patients' safety was ensured. The staff was exposed to the protocol and aware of it.

Conclusions The RED CODE caesarean protocol is efficient and easy to use. It provides high quality care and patients safety for life-threatening caesarean birth. A monthly technical maintaining test ensures the alarm system works and is known by the professional. In the future we wish to compare our system with that of a tertiary hospital, and measure team response time.

DUCTUS VENOSUS ATRESIA LEADING TO SEVERE HYDROPS FETALIS IN A VERY PRETERM INFANT

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Introduction The Ductus venosus (DV) connects the umbilical and the portal veins to the inferior vena cava in order to bypass the high-resistance hepatic vascular network and thereby directs umbilical vein blood with the highest oxygen content towards the myocardium and the brain. An absence (agenesis) or a secondary obliteration of an initially normally developed DV (atresia) is associated with various shunt types.

Casereport In the early course of the pregnancy of a healthy 34-year-old G2/P2 woman, an increased nuchal translucency thickness (4.8 mm) was seen by fetal ultrasound at 11 1/7 weeks of gestation. A routine check-up was performed at 27 5/7 weeks of gestation showing a hydrops fetalis with pleural effusions and ascites, which prompted a referral to the perinatal centre at the University Hospital Zürich. The apgar scores were 1, 1 and 6 at 1, 5 and 10 minutes respectively, and the arterial umbilical cord pH was 7.36. Subsequently, bilateral thoracic drains were placed to drain the pleural effusions. Further arterial hypotension was treated initially with volume replacement and dopamine; later on the infant needed additional Adrenaline, hydrocortisone and over short period of time noradrenaline. In the further course, a global respiratory insufficiency developed, which prompted a change of the ventilation strategy to high frequency oscillatory ventilation. The initially echocardiography showed normal anatomic structures with normal bi-ventricular function. Anemia and thrombocytopenia were treated by transfusions. The cranial ultrasound showed no cerebral hemorrhage. Despite maximal intensive care treatment, no improvement of the global situation was seen with persisting global respiratory and cardiovascular insufficiency. After having considered all aspects and options, a redirection of care was decided in common, and a change to comfort care was made. The girl died on 4th day of life in her mother`s arms. A secondary atresia of the DV was identified. The TORCH antibody screening was normal. Finally, a pathogenic de novo heterozygous mutation in the KRAS gene was found in a chorion biopsy probe.

Conclusion We conclude that for all cases of non-haemolytic hydrops fetalis, a prenatal or postnatal sonography and echocardiography of the venous system and of the heart should be performed. Furthermore, an investigation for RASopathies should be recommended according to presence of increased nuchal translucency thickness and polyhydramnion.

Neonatal transport in Switzerland: a retrospective single-center analysis – quo vadis?

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Aims and objectives To quantify neonatal transport activities by the neonatal transport teams of the Children's University Hospital Zurich. Analysis includes reasons for transfer, clinical characteristics of the neonates, medical interventions during transport and data on transport timing with special attention on preparation time.

Materials and methods Retrospective analysis of prospectively collected data on neonatal transports by neonatal transport teams of the Children's University Hospital Zurich between January 01st, 2014 and December 31st, 2018. Transport forms and medical charts of the transported neonates (corrected gestational age up to 44 weeks) were analysed by applying descriptive and explorative statistics. Transport data were assessed separately for urgent, non-urgent and re-transfers.

Results 1'110 transports including 883 (79.5 %) urgent, 105 (9.5 %) non-urgent and 122 (11.0 %) re-transfers took place during the study period. Ground transport accounted for 90.8 % and air transport for 9.2 % of the cases. The majority of the 1'050 transported neonates was term infants (75.4 %) and 59.0 % of all cases were transported within the first 24 hours of life. The most common reason for retrieval was respiratory distress (39.9 %) followed by cardiovascular (14.6 %), surgical (10.3 %), neurological (10.2 %), metabolic (8.6 %), infectious (8.5 %) and neurosurgical (1.7 %) diseases. On average, the time between the call and the arrival at the patient's bedside was 66 minutes for urgent transports with a mean preparation time of 42 minutes.

Conclusions Whereas in other transport settings[1] reasons for transport were predominantly respiratory distress, only 39.9 % referred to respiratory distress in this study indicating a more heterogeneous cohort. Therefore, neonatal transport teams require profound knowledge in handling all kind of neonatal patients to best meet their needs. Furthermore, process to improve preparation time must be defined in order to decrease it to less than 30 minutes according to standards set in North America[2].

1 McEvoy CG, Descloux E, Barazzoni MS, Diaw CS, Tolsa JF, Roth-Kleiner M. Evaluation of Neonatal Transport in Western Switzerland: A Model of Perinatal Regionalization. Clin Med Insights Pediatr. 2017;11:1179556517709021.

2 Taskforce on interhospital transport, American Academy of Paediatrics. Guidelines for air and ground transport on neonatal and paediatric patients, 2nd ed. Elk Grove Village: American Academy of Paediatrics, 1999:5.

PERINATAL STROKE AND PLACENTA PATHOLOGY

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Perinatal stroke remains an important cause of cerebral palsy and It affects between 1 in 1600 and 1 in 5000 term newborns. Despite improvement in perinatal care, neonatal imaging technics, much uncertainty persists regarding its underlying pathogenesis. Recent studies point to a multifactorial origin including both maternal and feta/neonatal factors. The placenta, being the main interface, is likely to play a key role and is the plausible source of emboli to the fetal brain circulation. However, placenta abnormalities in perinatal stroke have been poorly studies due to limited availability.

Materials and methods In this case series, we report 6 consecutives cases of perinatal stroke identified in our institution.

Results In five cases (four full-term newborn and one preterm newborn including one twin), perinatal stroke was diagnosed following focal seizures at birth and imaging showed acute unilateral neonatal stroke. In one single case, diagnosed was established after routine brain ultrasound in the setting of prematurity and twin pregnancy and was confirmed on brain MRI, showing already bilateral porencephalic cavities in the Sylvian territory. Placenta was available for all 6 cases, and showed various types of lesions. Placenta weight was increased in one single pregnancy, and was otherwise normal for gestational age. One twin monochorionic diamniotic pregnancy however showed disproportionate placenta attribution, the share of the affected twin representing only 1/5th of the total placental volume. The two other twin pregnancy were dichorionic diamniotic pregnancies. In one case, the placenta showed signs of decidual vasculopathy, with defective spiral artery remodeling, and villous chorangiosis. In the last twin pregnancy, the placenta of the affected twin only showed fetal vascular malperfusion, increased nucleated red blood cells, and low-grade chronic villitis. The three single pregnancies showed respectively umbilical vein and allantochorial thrombosis, acute chorioamnionitis with fetal inflammatory response, and subchorial hematoma with placental infarcts and intervillous thromboses.

Conclusion placenta pathology is often present after perinatal stroke but demonstrates a variety of findings pointing to non uniform physiopathology, that can lead to placental-fetal emboli.

Correlation of bilirubin levels with the quality of general movements in moderate preterms – a retrospective study

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Aims and objectives Preterm infants have an increased risk of developing kernicterus, the reason why lower limits for phototherapy and exchange transfusion have been established in treating hyperbilirubinemia.

Unphysiological hyperbilirubinemia can manifest itself in weight loss, fatigue and altered movement patterns. General Movements (GMs) are endogenously generated spontaneous movements that last until the end of the first half of the newborn's life and reflect the functionality of the young nervous system. By applying the Prechtl optimality concept, it is possible to assess the quality of GMs and thus the neurological integrity. This study examines whether there is a correlation between bilirubin levels and the quality of GMs in moderate preterm infants.

Materials and methods Based on the General Movement Optimality Score (GMOS), GMs of 55 moderate preterm infants were analysed globally and in detail using video recordings. Bilirubin levels closest to the video recording were collected from routine capillary blood tests and correlated with the quality of GMs and the GMOS.

Results Gestational age of the 55 moderate preterm infants ranged from weeks 33+1/7 to 33+6/7 (median : 33+1). Birth weight ranged from 1240 g to 3130 g (median : 1960 g). Mean APGAR-Score after 1 minute was 8, after 5 minutes 9 and after 10 minutes 9. None of the preterm infants had hypoxic-ischaemic encephalopathy, periventricular leukomalacia, intraventricular haemorrhage or hypoglycemia. 25 preterm infants (45 %) showed normal GMs. Almost half of the patient population (49 %) had poor repertoire GMs. Cramped-synchronised and chaotic GMs were observed in only two (4 %) and one child (2 %), respectively. The median bilirubin level was 8,7 mg/dl (148 µmol/l) with a limit of requiring phototherapy at 14 mg/dl (238 µmol/l). 2 moderate preterms (4 %) received phototherapy during their stay in hospital. At the time of the video recording, no preterm infant received phototherapy. The correlation coefficient between bilirubin levels and the GMOS is 0.293 at a significance level of 0,03. The correlation is statistically significant, however there is no clinical association between bilirubin levels and the quality of GMs.

Conclusions This study did not demonstrate clinical association between bilirubin levels and the quality of GMs. This may be due to the fact that bilirubin levels of moderate preterm infants were too low to detect changes in the quality of GMs.

IMPLEMENTATION OF MULTIDISCIPLINARY IN-HOUSE RESUSCITATION TRAININGS AT TRIEMLI SPITAL ZÜRICH

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Aims and objectives Based on the 2017 Swiss guideline "Neonatale Erstversorgung – interdisziplinäre Empfehlung"[1] as a joint initiative our aim was to implement a structured multidisciplinary cooperation between obstetric, paediatric and anaesthetic department as encouraged by the guideline working-group.

Main objectives of the initiative are 1) Improving the quality of the perinatal care of neonates 2) Improve teamwork through appreciating approaches and perspectives of other specialities 4) conduct resuscitation training in the "real working environment".

This approach should not replace other basic or advanced life support courses. It should strengthen the in-house interdisciplinary work in the daily setting.

Materials and methods The trainings will be integrated in the hospital directive. This should ensure and maintain a continuous exchange between the involved departments.

The training will be led by one doctor from the neonatal unit and one doctor from the department of anaesthesia. This will ensure that learning and improvements will be disseminated within multiple departments.

- 4h training with high-fidelity manikins
- 2 groups containing an equal number of participants from all 3 disciplines (doctors, nurses and midwifes). This will mirror the participants during a serious event.
- 2 complex scenarios – The scenarios are simulated until they reach their final conclusion
- A post scenario enhanced skill station

Evaluation The project started as a pilot in 2019 and will be continued in 2020 in a more standardized fashion including a quality control. To ensure this the questionnaires were designed together with the in-house quality-control-team.

The survey is divided into a short and long-term evaluation. The first part includes a pre and post-course evaluation to improve the course content and structure. The second part of the survey serves to evaluate the long-term impact on how staff members view the departmental safety culture. In particular, if departmental culture can be altered by the involvement of a few members in the training and encourage improvements in the coming years.

Conclusions We hope that this project will contribute towards a safer environment in the care of neonates by improving and enhancing multidisciplinary teamwork and help to empower staff members during resuscitation setting in the future.

Results from the first Evaluation will follow in 2021.

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[1] Paediatrica 28 ; Nr. 2, 2017;13-23; 8-12