ICNC-007  Presentation a pilot study of the effects of selective Dorsal Rhizotomy in children with Severe Spastic Cerebral Palsy, GMFCS IV, at one year post-operatively

Introduction:

The short and long-term benefits of selective dorsal rhizotomy (SDR) in children with spastic cerebral palsy (CP), GMFCS II and III (Gross Motor Function Classification System), have been described. We questioned whether children with more severe CP (GMFCS IV) may also benefit from SDR.

Methods:

Children with bilateral, predominantly spastic CP, GMFCS IV, were selected for SDR in a multidisciplinary clinic. Objective goals were agreed with parents. Outcome data was collected over 6-18 months postoperatively. Changes in spasticity, motor function and quality of life were tracked using Ashworth scores, GMFM-88 and 66 (Gross Motor Function Measure), CP Qual and PEDI (paediatric evaluation of disability inventory).

Results:

10 children, median age 5.3 years at surgery (range 3.5 – 9.8 ), underwent SDR between 2013 and 2014. Spastic tone was abolished (Ashworth 0) in all children. Additional muscle tightness with dystonia (mixed tonal pattern) was evident in most children before and persisted after SDR.

GMFM-88 / 66 improved from baseline median of 44.7 to 57.3 / 42.5 to 45.8 post-SDR. Most improvement occurred in the domains of B sitting (63.3 to 81.7) and C crawling and kneeling (52.4 to 66). None of the children deteriorated. All parents reported positive effects evident on CP Qual and PEDI scores.

Conclusion:

SDR significantly reduces spasticity in children with CP GMFCS level IV. Improvements were most marked in floor mobility and posture. Dystonia did not improve. The GMFM-88 scale is more sensitive than GMFM-66 in demonstrating post-operative changes. With clear goal setting, SDR should be considered as a potentially useful intervention in these children.

Lucinda Carr*(1); Kristian Aquilina(1); Deepti Chugh(1); Stephanie Cawke(1)r; Jacqueline Gordon(1); Neil Wimalasundera(1)

Neuroscience Department, Great Ormond Street Hospital, UK(1)
ABSTRACT BOOK PLATFORM

Thursday 5 May
Cerebral Palsy

ICNC-0013  Clinical profile of children with Cerebral Palsy born term compared to late- and post-term

BACKGROUND: In comparison to full term children with cerebral palsy (CP), the clinical profile of children with CP born late term and post-term is unknown. OBJECTIVE: To determine whether perinatal risks factors, neurologic subtype, severity, and comorbidities differ between full term-born children with CP compared to those born late term and post-term. DESIGN/METHODS: Using the Canadian CP Registry, the clinical profile of children born at 37 to 40 weeks gestation with CP (n = 686) was compared to late and post-term (41+ weeks) born children (n = 115). We used the Pearson chi-square test (χ² test) for univariate analyses of non-continuous categorical data. RESULTS: Neonatal encephalopathy was more common in children with cerebral palsy born late and post-term (33.6%) vs. term (23.9%) (p = 0.026). Neonatal hyperbilirubinemia was less common in late and post-term delivery (2.6%) vs. term delivery (10.2%) (p = 0.008). CP subtype, severity, and comorbidity spectrum did not differ between these gestational epochs. CONCLUSIONS: In children with cerebral palsy, neonatal encephalopathy was significantly more frequent in those born late and post-term, whereas neonatal hyperbilirubinemia was significantly lower. These observations have etiologic and preventative implications. The clinical profile of cerebral palsy was however similar between these two epochs.

Frank, R.(1)*; Garfinkle, J.(2); Oskoui, M.(3); Shevell, M.(3);
(1) McGill University, Faculty of Medicine, Montreal, Canada; (2) Montreal Children's Hospital, Department of Pediatrics, Montreal, Canada; (3) Montreal Children's Hospital, Departments of Pediatrics and Neurology & Neurosurgery, Montreal, Canada;
Prediction of outcome using a new preterm white matter injury classification

Introduction: White matter injury (WMI) is still the most important form of preterm brain injury leading to cerebral palsy (CP) and other neurodevelopmental impairments. MRI has shown that the spectrum of preterm WMI is wide and includes more subtle lesions. Our aim was to test the value of a new MRI scoring system to predict neurodevelopmental outcomes in preterm infants with WMI.

Methods: 70 preterm infants (gestation ≤35 weeks) with WMI diagnosed using sequential cranial ultrasound and confirmed on MRI, who survived the neonatal period, were included. WMI was classified as follows:

- **Early/mid MRI**
  - Focal DWA / PV PWML
  - Focal DWA / PV cysts
  - Extensive DWA / PV cysts

- **Term MRI**
  - Focal gliosis
  - Normal PLIC myelination
  - Focal PV cysts and/or mild VM, focal gliosis, sparse PLIC myelination
  - Extensive PV cysts and/or moderate VM, decreased WM volume, extensive gliosis, abnormal PLIC myelination

DWA: diffusion-weighted abnormalities
PLIC: posterior limb internal capsule
PV: periventricular
PWML: punctate white matter lesions
VM: ventriculomegaly

Infants were assessed (median age 24 months; range 18-36) with a neurological exam and neurodevelopmental tests (Griffiths/Bayley-III).

Results: The severity of WMI was strongly associated with the presence and severity of motor impairment and global developmental delay (Spearman's rank correlation 0.79 and 0.73 respectively; P<0.001). Severe WMI predicted severe CP (sensitivity 0.95; positive predictive value – PPV 0.76). Grade I WMI on all scans predicted no/mild CP (specificity and PPV 1.00).

Conclusions: This MRI scoring system can correctly identify preterm infants at high risk of neurodevelopmental impairment.

Miriam Martinez-Biarge*(1); Groenendaal, F.(2); Kersbergen, K.J.(2); Benders, M.J.(2); van Haastert, I.C.(2); Francesca Foti(1); Frances M Cowan(1); de Vries, L.S.(2)*;
(1) Department of Paediatrics, Imperial College London, UK; (2) Department of Neonatology, Wilhelmina Children’s Hospital, UMCU, The Netherlands;
Cerebral palsy (CP) in the Swedish national cohort of extremely preterm infants (EXPRESS); spectrum and co-morbidities

Objectives: The risk of CP is higher in preterm infants than in term infants. This risk increases with decreasing gestational age. In several outcome studies the prevalence of CP in preterms has decreased. The objective of this study was to show type and severity of CP as well as co-morbidities in a cohort of extremely preterm infants (EPT).

Methods: Population-based prospective cohort study of all Swedish children born at < 27 weeks of gestation between April 1st, 2004 and March 31st, 2007. Survivors were assessed at 2.5 and 6.5 years and compared with matched term controls. Of 707 live-born infants, 486 (69 %) survived to 6.5 years. 456 (92 %) were evaluated at the age of 2.5 and 441 (89 %), including 59 chart-reviewed children, at 6.5 years. Clinical examination, neuropsychological assessments, parental questionnaires and chart reviews were used for diagnosis and categorization of CP and associated co-morbidities. Results: When comparing all available data 48 children with CP were identified. At 2.5 years 32 of these were known. At 6.5 years 33 children had a bilateral and 9 a unilateral spastic CP. 71% were ambulatory (Gross Motor Function Classification System level ≤ II), 56% had cognitive/developmental level < -2SD compared with controls, 9 had epilepsy and 9 had diagnosed ASD and/or ADHD. Conclusions: In this cohort of EPT infants the prevalence of CP was low and the majority was ambulatory, however, there were a high proportion of children with accompanying impairments.

*Maria Hafström, M.(1)*; Karin Källén(2); Fredrik Serenius(3); Eva Rehn(1); Helen Drake(1); Ulrika Ådén(4); Aijaz Farooqi(5); Kristina Thorngren-Jerneck(6); Bo Strömberg(7);
(1)The Queen Silvia Children’s Hospital, University of Gothenburg, Göteborg, Sweden; (2)Centre of Reproductive Epidemiology, Lund University, Lund, Sweden; (3)Department of Women’s and Children’s Health, Section for Pediatrics, Uppsala University, Uppsala and Department of Pediatrics; (4)Department of Clinical Science, Intervention and Technology, Karolinska Institutet, Stockholm; (5)Department of Pediatrics, Institute of Clinical Sciences, Umeå University, Umeå; (6)Department of Pediatrics, Clinical Sciences Lund, Lund University, Lund; (7)Department of Women’s and Children’s Health, Section for Pediatrics, Uppsala University, Uppsala;
ICNC-0951  Clinical and magnetic resonance imaging characteristics in children with Dyskinetic Cerebral Palsy due to Neonatal Hyperbilirubinemia- A developing country experience

Introduction: We evaluated clinical and cranial magnetic-resonance-imaging (MRI) findings in dyskinetic children with serious hyperbilirubinemia

Methods: Seventy-five consecutive children with dyskinetic CP due to kernicterus, aged 1-14 years over 2 years underwent detailed evaluation, neurological examination and MRI

Results: Mean age at presentation was 36.9±34.2 month. Majority were males (N=50)67%, first-borns (N=36)48% and term-gestation (N=61)81%. Mean birth-weight was 2770±598 gm. Chief parental concerns were global developmental-delay (91%), abnormal twisting postures (59%) and speech difficulties (15%). Mean age-of-onset of neonatal jaundice was 3.4±1.1 day; mean highest-serum bilirubin was 30.4±7.6 mg/dL. Most neonates presented in acute-bilirubin-encephalopathy stage 2 (64%,N=48/75), received phototherapy (93%,N=70), exchange-transfusion 71%(N=53), had G-6-PD deficiency 27%(N=20) and Rh-isoimmunization 28%(N=21). Dyskinetic CP was predominantly dystonic type 85%(N=64), choreo-athetoid 11%(N=8) and mixed 4%(N=3). Mean Burke-Fahr-Marsden dystonia score was 4.5±21.1 (range 7-102.5). Hearing problems (42.7%,N=32), abnormal brain-stem-evoked-response (57%,N=43), upgaze palsy (57.3%,N=36), squint (35%,N=26) and enamel-staining (45.3%,N=34) were noted. Majority had motor-predominant developmental-delay (48%,N=36) followed by global delay (43%,N=32). Gross-motor-function-classification was level-V(56%), IV(18.7%), III(10.7%), II(9.3%) and I(5.3%). Overall, MRI showed involvement of basal-ganglia 84%(N=63), periventricular-white-matter 18.6%(N=14) and additional incidental/non-classifiable changes 20%(N=15). Interestingly, 6.7%(N=5) scans were normal and 4%(N=3) showed only incidental findings (focal hyperintensity, hippocampal atrophy and arachnoid cyst). Kernicterus predominantly affected globus-pallidi 83%(N=62), subthalamic-nuclei 24%(N=18) and substantia-nigra 16%(N=12). Isolated pallidum involvement was seen in 53%(N=40), pallidum+subthalamic nucleus in 16%(N=12), pallidum+substantia nigra in 6.6%(N=5) and all three in 6.6%(N=5). Conclusion: Ours is one of the largest studies in dyskinetic children with hyperbilirubinemia from a developing country. Radiologically, evidence of kernicterus is seen in globus-pallidi, subthalamic-nuclei and substantia-nigra causing marked disability and functional limitation.
Complementary and Alternative medicine use among children with chronic neurological disorders in Enugu, Nigeria

Background: Complementary and alternative medicine (CAM) remains an important feature of healthcare in developing countries. In many countries, the belief that most neurological conditions have spiritual, environmental, or psychological cause contributes to inadequate treatment, adherence issues, and a greater dependence on alternative treatment in attempts at self-care.

Objective: to describe CAM use and its effect on health-seeking behavior of children with chronic neurological disorder in Enugu, Nigeria.

Method: A cross-sectional survey on CAM use among children attending the above clinic. Primary caregivers were interviewed using standardized interviewer-administered questionnaires on CAM use. The information obtained comprised the demographic characteristics of both the caregivers and the patients; disorder-related variables and relevant data on CAM use.

Result: A total of 166 qualified parents were interviewed. 87 (52.4) had ever used CAM for the child's condition. However 27 (16.3%) were currently using CAM. Majority of the patients have used more than one form of CAM. Alternative medicine, herbal remedies and mind-body interventions were most commonly used therapies and CAM use was associated with duration of delay before presentation to the hospital. Current use of CAM for epilepsy and CP patients were 14.7% and 26.9% respectively. Conventional therapy has ever been abandoned for CAM by 13 (15%) patients. Perceived benefits for CAM was documented in 33.3% of current users and majority were on mind-body interventions. Level of education of father was associated with the use of CAM (p=0.008).

Conclusion: Use of CAM for chronic neurological disorder is common and is associated with delay before presentation.

Ngozi Ojinnaka *(1) ; Ann Ebele Aronu(1) ; Bisbuth Eke(1) ; Roland Chidi Ibekwe(1)

(1) University of Nigeria Nsikka, Nigria
Mechanisms of transcranial direct-current stimulation (tDCS)-enhanced motor learning in healthy children

Introduction: tDCS enhances motor learning in adults but is untested in children. Unique tDCS effects may occur in the developing brain, confounding trial design in children with cerebral palsy. We investigated the neurophysiology underlying tDCS-induced enhancement of motor learning in children.

Methods: Twenty-four healthy right-handed children (7-17y) practiced a motor task (Purdue Pegboard Test; PPT) over 3 consecutive days with their left hand. Anodal (right M1, 1mA), cathodal (left M1, 1 or 2mA) or sham tDCS was randomly applied during the first 20 minutes. Transcranial magnetic stimulation (TMS) explored bihemispheric M1 neurophysiology at baseline and post-training. Outcomes included cortical excitability, short-interval intracortical inhibition (SICI), intracortical facilitation, cortical silent periods (cSP) and interhemispheric inhibition (IHI).

Results: tDCS enhanced motor learning, increasing performance by >40% in all treatment groups (p<0.001). Baseline PPT scores were negatively correlated with right M1 cSP (r=-0.541) and positively correlated with SICI (r=0.420). Anodal tDCS increased cortical excitability (p<0.05) whereas 2mA (but not 1mA) cathodal tDCS reduced excitability and increased SICI (p<0.05). Transcallosal inhibition effects included increased IHI with anodal and 2mA cathodal tDCS (p<0.05) and decreased IHI with 1mA cathodal tDCS (p<0.01). Training alone (sham) was not associated with measureable changes in neurophysiology.

Conclusions: tDCS enhances motor learning in healthy children, producing measurable changes in cortical excitability, intracortical inhibition, and transcallosal inhibition. Increased cortical inhibition may be associated with lower motor function. Such elucidation of tDCS mechanisms of neuromodulation will inform optimization of stimulation parameters when applying tDCS to children with cerebral palsy.

Ciechanski, P.(1)*;Zewdie, E.(2);Kirton, A.(3);
(1)University of Calgary, Neurosciences, AB, Canada;(2)University of Calgary, Pediatrics, AB, Canada;(3)University of Calgary, Pediatrics & Clinical Neurosciences, AB, Canada;