1. Managing to Learn Bimanual Activities - Experiences From Children and Adolescents With Cerebral Palsy - A Qualitative Analysis
Git Lidman, Kate Himmelmann, Marie Peny-Dahlstrand


Purpose: Children and adolescents with cerebral palsy often have impaired hand function. This makes it difficult for them to deal with everyday activities. The aim of the study was to explore the experiences of children and adolescents with unilateral spastic cerebral palsy when it comes to learning and dealing with activities requiring bimanual use. Method: Ten participants, attending mainstream schools, with unilateral spastic cerebral palsy (10-18 years, MACS-level I-III) took part in semi-structured interviews. Qualitative analysis with verbatim transcripts were analysed using a Grounded Theory approach. Results: The learning of bimanual activities was described as a process taking place in interaction with the dynamics of everyday situations. Five categories describing the participants experiences emerged: "Reaching a point where you want to learn", "Awareness and acceptance of your own abilities", "Dealing with the boundaries of the disability", "Dealing with the impact of people around you" and "Strategies for learning". A multi-dimensional theory was derived, summarising how the participants learned bimanual activities in daily life. Conclusions: Children and adolescents with unilateral spastic cerebral palsy express that the process of learning bimanual activities can only take place when it fits in with life as it unfolds. Thus, they have to adapt to a changing context and their own developing skills. Implications for Rehabilitation: This study support a person-centred perspective in the process of learning bimanual activities. Interventions need to be tailored to life situations and embedding in child's and adolescents everyday lives. The therapist must be compliant with the child's and adolescents desire for learning.

PMID: 32466667

2. Repeated Episodes of Pediatric Constraint Induced Movement Therapy With a Gross Motor Training Component: A Prospective Cohort Study
Kathy Grinde, Jayne Myhre, Michael D Finch


Purpose: To examine the results of repeated episodes of 21-day pediatric constraint induced movement therapy (PCIMT) paired with gross motor training (GMT). Methods: Nineteen children, age 14 months - 6 years with unilateral upper extremity impairment enrolled in this cohort study to receive repeated episodes of 21 day PCIMT-GMT. Outcome measures included the Peabody Developmental Motor Scales-2 (PDMS-2), the Assisting Hand Assessment (AHA) and the Canadian Occupational Performance Measure (COPM). Results: All children demonstrated improvement in raw scores following each episode of PCIMT-GMT with a statistically significant change in the least squares estimated mean for all measures except the
3. Comparison of Staged Versus Same-day Bilateral Hip Surgery in Nonambulatory Children With Cerebral Palsy

Craig R Louer, Jason Nunez, James D Bomar, Megan E Fischer-Colbrie, Henry G Chambers, Vidyadhar V Upasani


Background: Bilateral hip reconstructions with osteotomies are commonly required in patients with severe cerebral palsy (CP) and dysplasia. These procedures can be performed by staging each hip surgery, separated by weeks to months, or by addressing both hips in a single-event surgery. The optimal timing of such surgery is yet to be determined. The purpose of this study was to retrospectively compare major complications between the staged and single-event approaches. Methods: Medical records of patients who underwent bilateral hip osteotomies, with at least one side including a pelvic osteotomy, were retrospectively reviewed. Subjects were identified who had a diagnosis of nonambulatory CP (defined by Gross Motor and Functional Classification System level IV or V), and at least 1 year of clinical follow-up. All hips were treated by 1 of 7 surgeons: 2 surgeons who always performing single-event surgery and 5 who always perform staged surgeries. Complications were stratified by the Modified Clavien-Dindo Classification (grades 1 to 5). The primary outcome was major complications (grade ≥3), while minor complications, readmissions, reoperations, and resource utilization outcomes were investigated secondarily. Results: Sixty-five patients met our inclusion criteria: 35 received single-event surgery and 30 received staged surgery. The staged group had a higher rate of major complications per patient (0.30 vs. 0; P=0.013). Unplanned readmissions and reoperations were likewise increased in the staged group. Minor complication rates were high in both groups, with no differences observed between staged and single-event approaches (3.27 per patient vs. 2.91; P=0.952). There were no complications causing permanent disability or death. The total length of stay (6.2 vs. 4.0 d; P<0.001) and mean nonsurgical operating room time (65.7 vs. 45.6 min; P<0.001) were increased in the staged group versus the single-event group. Conclusions: The staged approach to bilateral hip reconstructions in the nonambulatory CP population was associated with a higher rate of major complications compared with a single-event approach. Minor complications were similar for both approaches. Both approaches can have an acceptable safety profile with no observed grade 4 or 5 complications. Level of evidence: Level III.

PMID: 32453016

4. Immediate Effect of Induced Fatigue of the Unaffected Limb on Standing Balance, Proprioception and Vestibular Symptoms in Children With Hemiplegia

Marwa M Nageeb Abdin, Faten Abdelazeim, Shorouk Elshennawy


Objectives: To study the effect of induced fatigue of the unaffected limb on the sensory components of standing balance; proprioception and vestibular symptoms in children with hemiplegic cerebral palsy. Methods: Setting: Outpatient Clinic of Faculty of Physical Therapy, Cairo University. Patients: Twenty-nine children with hemiplegic cerebral palsy [(ages 8.9 ± 2.3 years), motor ability I/II according to the GMFCS and spasticity of I/II+ according to the Modified Ashworth Scale]. Outcome measures: Before and after the induced fatigue of the unaffected limb, the following measures were recorded: postural balance, using the Biodex Balance System and the Timed Up and Go test; vestibular sense, using the Paediatric Vestibular Symptom Questionnaire; and proprioception measures of both knees, using the Biodex isokinetic dynamometer. Results: There was a significant increase in the post-fatigue values for the overall stability index (p< 0.05), the Timed Up and Go test (p< 0.05), reposition errors of proprioception of the unaffected limb (p< 0.05) and the vestibular questionnaire (p< 0.05); there was a non-significant decrease in the post-fatigue values for reposition errors of proprioception of the affected limb (p= 0.859). Conclusion: Fatigue of the unaffected limb negatively affects postural balance and related sensory systems (proprioception of the fatigued limb and vestibular function) but does not have an impact on proprioception of the unfatigued limb.
5. [Advances on Selective Posterior Rhizotomy for Lower Limb Function in Patients With Cerebral Palsy] [Article in Chinese]
Jie Xu, Lin Xu, Jie Zeng, Chuan-Yu Hu, Jing-Pei Ren, Yi Zhao, Le Wang, Ya-Lin Zhao, Xiao-Hong Mu

Cerebral palsy is a common clinical syndrome of neurological disability in childhood, which seriously affects the quality of life of children and their families, and brings a heavy economic burden to the society. Domestic and foreign scholars had a long history of the application of selective posterior rhizotomy for the treatment of spastic cerebral palsy or mixed cerebral palsy with limb paralysis. It is effective in improving the lower extremity spasm of patients with cerebral palsy, and there are few cases with recurrences. After rehabilitation therapy, the muscle strength of patients with cerebral palsy was significantly improved compared with the previous one. The range of motion was significantly improved after operation, and there is no rebounded in aspect of joint activity in the long-term follow-up. The overall gait of the patient was significant improved. The author thought that selective posterior rhizotomy is effective in improving the motor function of lower limbs in patients with cerebral palsy, and it is worth being spread. However, it has to follow the principle of selecting appropriate cases before surgery, precise operation during operation, and timely and effective rehabilitation treatment after surgery, in order to achieve a better curative effect.

PMID: 32452192

6. Effects of Dual Task on Gait Velocity and Cadence in Cerebral Palsied Children With Spastic Hemiparesis or Diparesis
Alper Kocak, F Yarar, U Cavlak

Gait is generally considered an automated process with little or no cognitive input. In most individuals with Cerebral Palsy (CP), walking restrictions may accompany during childhood and adolescence. The aim of this study was to determine the effects of dual task on Gait Velocity (GV) and Cadence (C) in Cerebral Palsied Children with Spastic Hemiparesis or Diparesis (CPCSHD). Fourteen boys, seven girls' spastic hemiparesis children (mean age: 13.33 ± 3.79 years) and twelve girls, nine boys' diparesis children (mean age: 14.44 ± 3.24 years) were included in the study. Forty-two CPCSHD having level 1 or 2 according to the Gross Motor Function Classification System (GMFCS) were included in this comparative study. GV was calculated using a chronometer for a 10-m walk on the ground with shoes. Cadence was calculated accounting the number of steps during 1-min walk. Both GV and C tests were performed by each participant with single task first. After the single task, all were asked to perform the dual task carrying a plastic water-filled bottle. There were no significant differences between the hemiparesis and diparesis in terms of demographics data. When children with hemiparesis and diparesis compare each other, no significant differences were found in terms of all the outcome parameters. The results obtained from this study indicate that walking speed and cadence decrease during a dual motor task in CPCSHD (p > 0.05). When hemiparesis and diparesis groups were compared, no difference was found between the groups.

PMID: 32449134

7. Effects of Solid Ankle-Foot Orthoses With Individualized Ankle Angles on Gait for Children With Cerebral Palsy and Equinus
Kyra J Kane, Kristin E Musselman, Joel Lanovaz

Purpose: For children with cerebral palsy (CP) and equinus, the conventional practice of setting the ankle angle in an ankle-foot orthosis (AA-AFO) at 90° may not adequately accommodate gastrocnemius length/stiffness. Therefore, this study compared
the effects of statically-optimized solid AFOs with individualized AA-AFOs (iAA-AFOs) and conventionally-prescribed AFOs on gait for children with CP and equinus. Methods: Ten children with CP and equinus (15 limbs with AFOs), and 15 typically-developing (TD) children participated. For the children with CP, solid AFOs with iAA-AFOs (range = 5°–25° plantarflexion) were compared with their usual AFOs using three-dimensional gait analysis. TD children walked in shoes only. Peak values and Gait Variable Scores (GVS) for joint and segment variables were calculated for stance phase. Responses were categorized using 90% confidence intervals relative to TD data, for each affected leg. Results: Net responses to iAA-AFOs were positive for 60% of limbs and negative for 40%. Knee variables (GVS and peak extension, flexion, and midstance moment) were most positively affected, and foot-floor angle and vertical ground reaction force were most negatively impacted. Conclusion: Individualized AFO prescription and iAA-AFOs can impact gait biomechanics for some children with equinus, compared to conventionally-prescribed AFOs. Optimizing dynamic alignment for walking may further improve outcomes.

PMID: 32444574

8. A Case Study on Interface Pressure Pattern of Two Garment Orthoses on a Child With Cerebral Palsy
Ida Hasni Shaari, Noor Azuan Abu Osman, Hanie Nadia Shasmin


Many studies have shown that medical compression products produce different levels of interface pressure during the usage of the products. However, limited studies have explored the pattern of interface pressure exerted by orthotic garments. This case study aimed to investigate the pattern of interface pressure exerted by two types of orthotic garments on a child with cerebral palsy. A 13-year-old child diagnosed with ataxic spastic diplegia cerebral palsy has difficulty to perform sit-to-stand motion even with a walking frame due to his truncal ataxia. A TheraTogsTM orthosis and a Dynamic Lycra® Fabric Orthosis (DLFO) were prepared for the child. The child's sit-to-stand ability without and with the usage of orthoses was recorded using five sit-to-stand tests. The garments' interface pressure was measured using F-scan (9811E) and F-scan 6.5.1 version software. The pressure was recorded when the child was in sitting position and performing sit-to-stand-to-sit motion. Overall, the child completed the five sit-to-stand test duration within 2.53 ± 0.04 s and 2.51 ± 0.09 s with the usage of TheraTogsTM orthosis and DLFO, respectively. Higher pressure was exerted by Dynamic Lycra Fabric Orthosis (axillary = 122 mmHg) in contrast to TheraTogsTM orthosis (77 mmHg) when the child was in a sitting position. Lower pressure was exerted by DLFO (7 mmHg), over xiphoid level and for TheraTogsTM orthosis is 1.2 mmHg over axillary level when the child was performing sit-to-stand motion. The largest range of pressure was exerted by TheraTogsTM orthosis with a minimum pressure of 5 mmHg and a maximum pressure of 155 mmHg during sit-to-stand motion. Overall, the DLFO exerted higher mean interface pressure on the child in comparison to TheraTogsTM orthosis when the child's body was in a sitting position wearing both upper garment and pants. Both TheraTogsTM orthosis and DLFO presented a different range of interface pressure over different body segments and activities.

PMID: 32459140

9. Lessons Learned From Conducting a Pragmatic, Randomized, Crossover Trial on Robot-Assisted Gait Training in Children With Cerebral Palsy (PeLoGAIT)
Corinne Ammann-Reiffer, Caroline H G Bastiaenen, Andreas D Meyer-Heim, Hubertus J A van Hedel


Purpose: To investigate the effectiveness of outpatient robot-assisted gait training (RAGT) in ambulatory children with spastic cerebral palsy. Methods: Children were randomized to two different intervention sequences within a pragmatic crossover design. They performed five weeks of RAGT (3 sessions per week) and five weeks of usual care (UC). Dimension E of the Gross Motor Function Measure - 88 (GMFM E) was the primary outcome as well as Dimension D (GMFM D), and timed walking tests were assessed before and after each treatment sequence and after a 5 - week follow - up. Results: The trial was stopped early because of recruitment problems. We included 16 children with a mean age of 11.3 years (6.0-15.3 years). GMFM E median (IQR) change scores were - 0.7 (-2.8 to 3.5) after RAGT and 0 (-2.4 to 2.4) after UC. Neither GMFM E nor any secondary outcome measure changed significantly after RAGT or UC, nor were any period, follow - up, or carry - over effects observable. Conclusions: RAGT as a single intervention was not effective in improving walking abilities in the included children. It should be embedded in a holistic treatment approach, as it cannot cover all aspects relevant to gait. Furthermore, children's personalized rehabilitation goals should be carefully monitored with individualized measurement instruments.
Hamza Sucuoglu

Purpose: To investigate the effects of robot-assisted gait training (RAGT) alongside conventional therapy on the standing and walking abilities of children with cerebral palsy (CP). Methods: The study sample consisted of children (aged 4-18 years) with CP whose gross motor function classification system (GMFCS) was at levels I-V. In total, 75 children with CP were evaluated and 38 patients completed the study. Patients were divided into two groups as GMFCS levels I-III (Group 1) and levels IV-V (Group 2). RAGT (30 min/session) and conventional physiotherapy (30 min/session) were applied together in the treatment. The treatment duration was 60 min per session, 3 or 4 sessions per week, for a total of 30 sessions over 8-10 weeks. 10-meter walk test (10MWT), 6-min walk test (6MinWT), gross motor functional measurement 66 (GMFM66) -D, and -E tests were performed. Results: We showed that in both groups of CP patients (mild-moderate and severe), meaningful improvements were seen in the standing (D) and walking (E) sections of GMFM after treatment. When we compared the post-treatment changes in 10-m walk test, 6-min walk test, GMFM66-D, and -E between Groups 1 and 2, we noted that the improvements were statistically significant in favor of Group 1 (p< 0.01). Conclusion: RAGT in combination with a conventional treatment program was significantly associated with improvements in the standing and walking abilities of children with mild to moderate CP (GMFCS levels I-III).

PMID: 32444570

11. Effects of Reflexology on Child Health: A Systematic Review
Nimet Karatas, Aysegul Isler Dalgic

Background: It is known that the parents of one of every two children who need health care seek at least one complementary health-care approach. Reflexology, which is one of these, increases well-being while maintaining the continuity of homeostasis. As studies with children are limited, there is a need for evidence that includes the positive as well as the negative effects of reflexology that can be transferred to clinical practice and recommendations for future studies. Aim: The aim of this study was to examine the effects of reflexology on child health by systematically summarizing the results obtained. Method: In this study, which was structured as a systematic review, data were obtained by scanning CINAHL, Cochrane Library, Academic Search Complete, WoS, Scopus, Science Direct, PubMed, and ProQuest. According to MeSH terminology, (zone therapy OR reflexology OR foot massage OR hand massage) AND (pediatrics OR child OR infant OR baby) were used. Randomized controlled studies (RCTs), systematic reviews, and meta-analyses conducted with a pediatric population and accessible in English and full text up to 07.08.2019 (with no time limitation) were included. Exclusion criteria for the present study included applying a massage procedure different from reflexology, the inclusion of an adult sample, or publication of the article in a predatory journal. The Cochrane guidelines (Handbook for Systematic Reviews of Interventions Version 5.2.0, 2017) were applied and the article reported on according to the PRISMA checklist. Results: In all six of the RCTs, which included a total of 277 infants and children, the only method used was foot reflexology. Regarding the results of nine investigated outcomes, reflexology was found to be effective in infancy for reducing pain level and regulating heart rate, for increasing oxygen saturation, for relieving infantile colic symptoms, and neonatal abstinence symptoms. Reflexology was also found to decrease spasticity and improve motor skills in children with cerebral palsy, but it failed to produce positive change in regard to constipation and quality of life. Four of the studies were performed in a nursing context, one in midwifery, and one in physiotherapy. Conclusion: As a common result of the studies conducted with different sample groups, it is possible that reflexology had positive effects on children. However, the absence of standardization related to reflexology, inadequate use of a study protocol and guidelines, the heterogeneity of the data, and the determination that half the studies were conducted with high-risk groups according to the bias analysis with RoB 2.0 indicate that it is too soon to generalize the results. Well-structured, randomized controlled double-blind trials are required.

PMID: 32444044
12. Influence of Aquatic Therapy in Children and Youth With Cerebral Palsy: A Qualitative Case Study in a Special Education School
Elisa Muñoz-Blanco, Javier Merino-Andrés, Beatriz Aguilar-Soto, Yolanda Castillo García, Marta Puente-Villalba, Jorge Pérez-Corrales, Javier Güeita-Rodríguez


Cerebral palsy results in the progressive loss of motor functions, with a negative impact on daily activities and participation. Despite the well described benefits of aquatic therapy in children, little is known about the effects of the same in school settings. This study aimed to describe the experience of children and youth with cerebral palsy participating in an aquatic therapy program within a special education school considering their educational and therapeutic perspectives. A qualitative descriptive case study with embedded units was developed, comprising 27 participants. This study employed purposeful sampling to include children and youth with cerebral palsy from the Asociación Ayuda a la Parálisis Cerebral (APACE) special education school, together with their parents, the special education teachers, and health care professionals. Data were collected via non-participant observation, semi-structured and informal interviews, focus groups, and researcher field notes. A thematic analysis was conducted, revealing the following themes: (a) the connection with the environment; (b) postural improvements and mobility; (c) the opportunity to perform tasks; (d) learning and transfer. A motivating environment leads to physical, cognitive and social benefits, both at school and in the home. Aquatic therapy was viewed as a means for learning and participation. These findings may enhance understanding regarding the potential benefits of implementing multidisciplinary aquatic therapy programs in specialist school settings.

PMID: 32456241

13. Communication Modes and Functions in Children With Cerebral Palsy
Emily D McFadd, Katherine C Hustad


Purpose This study seeks to determine how speech-language impairments relate to the frequency and diversity of communication modes and functions produced by children with cerebral palsy (CP) during interactions with their mothers. Method We studied 40 children with CP (M age = 62 months) comprising three groups: those who were unable to speak and had anarthria (n = 15), those with speech motor impairment and language comprehension impairment (SMI-LCI; n = 15), and those with speech motor impairment and typical language comprehension (SMI-LCT; n = 10). Mother-child play interactions were coded for child modes and functions. Generalized linear regression models were used to examine the relationship between profile group and frequencies of communication modes and functions. Results Results indicated groups SMI-LCI and SMI-LCT had significantly higher mean frequencies of vocalizations, vocalizations + gestures, comments, initiations, and requests than the group of those who were unable to speak and had anarthria. All children used vocalizations primarily, though these vocalizations were often not understood. SMI-LCI and SMI-LCT differed on two measures: frequency of gestures and frequency of initiations. The majority of children in this sample did not have access to augmentative and alternative communication devices. Conclusion Results of this study highlight the need for parent-mediated interventions for children with CP that emphasize multimodal communication tailored to impairment profiles. Supplemental Material https://doi.org/10.23641/asha.12354704.

PMID: 32459163

14. Awakening Cortisol Indicators, Advanced Glycation End Products, Stress Perception, Depression and Anxiety in Parents of Children With Chronic Conditions
Marija Ljubičić, Lada Baković, Martina Coza, Ajka Pribisalić, Ivana Kolčić


This cross-sectional study aims to investigate awakening cortisol indicators and to explore their association with stress perception, advanced glycation end products (AGEs), depression and anxiety in parents of children with chronic conditions. We included five parental groups according to children's diagnoses: Down syndrome (DS; N = 31), autistic spectrum disorder
(ASD; N = 29), cerebral palsy (CP; N = 15), diabetes mellitus type 1 (DMT1; N = 38), and a control group of healthy children (CG; N = 33). Salivary cortisol and AGEs were measured, alongside with psychological indices. Partial correlation and multiple linear regression were used in the analysis to identify parental characteristics associated with total awakening cortisol output (area under the curve with respect to the ground, AUCG), cortisol awakening response (area under the curve with respect to the increase, AUCI), perceived stress, and health outcomes (AGEs, depression and anxiety). There was no difference between groups for AUCG, while DS and DMT1 groups showed reduced AUCI ($\beta = -0.241, p = 0.040$; $\beta = -0.249, p = 0.028$, respectively), and ASD parents had a borderline insignificant result ($\beta = -0.205, p = 0.081$). Non-smokers had higher AUCG, and parental sedentary activity and sleep duration were associated with AUCI. AUCG was positively associated with AGEs ($\beta = 0.218, p = 0.013$), anxiety ($\beta = 0.207, p = 0.004$), and with depression ($\beta = 0.156, p = 0.034$), unlike the AUCI. DS parental group showed lower general stress perception ($\beta = -0.260, p = 0.005$). Parents of children with DMT1 had more pronounced depressive symptoms ($\beta = 0.183, p = 0.039$), while CP parents had a borderline insignificant result for depression ($\beta = 0.143, p = 0.058$). Based on these results, parents of children with chronic conditions have altered awakening cortisol response and are under increased risk of adverse health consequences.

PMID: 32450487

15. The Association of Hepatoblastoma, Prematurity and Cerebral Palsy: Case Reports
Jessica R Pruente, Dawn E Deike, Barbara Lockart, Deborah Gaebler-Spira


Purpose: Hepatoblastoma is the most common primary liver tumor in children and has a greater incidence in children with a history of prematurity and very low birth weight. To increase awareness of the association between prematurity and hepatoblastoma for health care providers who treat children with Cerebral Palsy (CP), we present two case reports. Methods: Two case reports of premature, very low birth weight infants with hepatoblastoma are described and a literature review of hepatoblastoma in the setting of prematurity and cerebral palsy is performed. Results: Each patient had a history of 26-28 week prematurity, very low birth weight, and CP. Both presented with worsening constipation and abdominal distension that did not respond to oral medications. Appropriate referrals to the ER were made which lead to a diagnosis of hepatoblastoma. Pediatric rehabilitation was a source of referral for diagnosis in one patient and aided in the rehabilitation course following treatment for both patients. Conclusions: Hepatoblastoma is the most common primary liver tumor in children and has an increased incidence in children with a history of prematurity and very low birth weight. Providers who frequently care for the very low birth weight and premature children with CP should be aware of this correlation and include hepatoblastoma in the differential when managing patients with suddenly worsening constipation or abdominal distension. Pediatric physiatrists and other providers for these patients could be a source of referrals and diagnosis leading to timely treatment.

PMID: 32444576

16. Tailored Interventions to Reduce Hospital Admissions for Individuals With Cerebral Palsy
Menggang Yu, Ryan J Collier, Amy J Kind


PMID: 32449170

17. Have Outcomes Following Extremely Preterm Birth Improved Over Time?
Jeanie Ly Cheong, Alicia J Spittle, Alice C Burnett, Peter J Anderson, Lex W Doyle


Increased survival of infants born preterm, especially those born extremely preterm (<28 weeks' gestation), has meant that more are reaching later childhood and adulthood. As preterm birth is associated with a higher risk of neurodevelopmental
deficits, the aim of this review was to determine whether or not the advances in perinatal care that led to improved survival have also had a positive impact on long-term neurodevelopment. Studies examining temporal changes in neurodevelopment are limited, and only from high-income countries. However, based on available published data, there is no definite trend of improved neurodevelopment at school age for neurosensory, cognitive, academic achievement, motor or executive function with time. Cerebral palsy rates, however, may be decreasing. More research is needed into the potential contributors for the trends observed, and also for other outcomes such as mental health and behavior.

PMID: 32451304

18. Cerebral Palsy
Deborah Gaebler-Spira, Michael Green


PMID: 32444579

19. Diffuse Excessive High Signal Intensity on Term Equivalent MRI Does Not Predict Disability: A Systematic Review and Meta-Analysis
Chandra Prakash Rath, Saumil Desai, Shripada C Rao, Sanjay Patole


Objective: To evaluate whether diffuse excessive high signal intensity (DEHSI) on term equivalent age MRI (TEA-MRI) predicts disability in preterm infants. Design: This is a systematic review and meta-analysis. Medline, EMBASE, Cochrane Library, EMCARE, Google Scholar and MedNar databases were searched in July 2019. Studies comparing developmental outcomes of isolated DEHSI on TEA-MRI versus normal TEA-MRI were included. Two reviewers independently extracted data and assessed the risk of bias. Meta-analysis was undertaken where data were available in a format suitable for pooling.

Main outcome measures: Neurodevelopmental outcomes ≥1 year of corrected age based on validated tools. Results: A total of 15 studies (n=1832) were included, of which data from 9 studies were available for meta-analysis. The pooled estimate (n=7) for sensitivity of DEHSI in predicting cognitive/mental disability was 0.58 (95% CI 0.34 to 0.79) and for specificity was 0.46 (95% CI 0.20 to 0.74). The summary area under the receiver operating characteristics (ROC) curve was low at 0.54 (CI 0.50 to 0.58). A pooled diagnostic OR (DOR) of 1 indicated that DEHSI does not discriminate preterm infants with and without mental disability. The pooled estimate (n=8) for sensitivity of DEHSI in predicting cerebral palsy (CP) was 0.57 (95% CI 0.37 to 0.75) and for specificity was 0.41 (95% CI 0.24 to 0.62). The summary area under the ROC curve was low at 0.51 (CI 0.46 to 0.55). A pooled DOR of 1 indicated that DEHSI does not discriminate between preterm infants with and without CP. Conclusions: DEHSI on TEA-MRI did not predict future development of cognitive/mental disabilities or CP. Prospero registration number: CRD42019130576.

PMID: 32451357

Prevention and Cure

20. Genetic and Epigenetic Factors and Early Life Inflammation as Predictors of Neurodevelopmental Outcomes
Kirsi S Oldenburg, T Michael O'Shea, Rebecca C Fry


Among individuals born very preterm, perinatal inflammation, particularly if sustained or recurring, is highly likely to contribute to adverse neurodevelopmental outcomes, including cerebral white matter damage, cerebral palsy, cognitive impairment, attention-deficit/hyperactivity disorder, and autism spectrum disorder. Antecedents and correlates of perinatal
inflammation include socioeconomic disadvantage, maternal obesity, maternal infections, fetal growth restriction, neonatal sepsis, necrotizing enterocolitis, and prolonged mechanical ventilation. Genetic factors can modify susceptibility to perinatal inflammation and to neurodevelopmental disorders. Preliminary evidence supports a role of epigenetic markers as potential mediators of the presumed effects of preterm birth and/or its consequences on neurodevelopment later in life. Further study is needed of factors such as sex, psychosocial stressors, and environmental exposures that could modify the relationship of early life inflammation to later neurodevelopmental impairments. Also needed are pharmacological and non-pharmacological interventions to attenuate inflammation towards the goal of improving the neurodevelopment of individuals born very preterm.

PMID: 32444251

21. Antenatal Corticosteroids and Outcomes in Preterm Twins
Takafumi Ushida, Tomomi Kotani, Ryo Sadachi, Akihiro Hirakawa, Masahiro Hayakawa, Yoshinori Moriyama, Kenji Imai, Tomoko Nakano-Kobayashi, Fumitaka Kikkawa, Neonatal Research Network of Japan


Objective: To estimate whether improvement in outcomes from antenatal corticosteroid treatment in extremely and very preterm twins is similar to that observed in singletons, and to investigate whether antenatal corticosteroid treatment has different effects according to chorionicity or birth order. Methods: This population-based study was based on an analysis of data collected by the Neonatal Research Network of Japan from 2003 to 2015 of neonates weighing 1,500 g or less at birth, from gestational ages of 24 0/7 to 31 6/7 weeks of gestation. After propensity score matching, univariate logistic and interaction analyses were performed to compare short-term (neonatal period) and medium-term (3 years of age) outcomes of the children of mothers who received antenatal corticosteroids with those of children of mothers who did not receive antenatal corticosteroids. We focused on differences between singletons and twins, between monochorionic and dichorionic twins and between the first and second twin. Results: The study comprised 23,502 singletons and 6,546 twins. Antenatal corticosteroid treatment was associated with significant decreased short-term neurologic outcomes in both singletons and twins. However, antenatal corticosteroid treatment was associated with significantly decreased mortality (odds ratio [OR] 0.61; 95% CI 0.53-0.70), respiratory distress syndrome (OR 0.71, 95% CI 0.67-0.76), and cerebral palsy (OR 0.85, 95% CI 0.72-0.99) in singletons but not in twins (OR 0.89, 95% CI 0.68-1.17; OR 0.99, 95% CI 0.87-1.12; and OR 0.82, 95% CI 0.61-1.11, respectively). No association was found between chorionicity and the efficacy of antenatal corticosteroid treatment on outcomes. Further, no association was found between birth order and the efficacy of antenatal corticosteroid treatment on outcomes, except for periventricular leukomalacia and necrotizing enterocolitis (interaction: P=.02 and P=.04, respectively). Conclusion: Antenatal corticosteroid treatment in twins was associated with a beneficial effect on short-term neurologic outcomes only, without improvement in other short-term and medium-term outcomes. There was no difference related to chorionicity.

PMID: 32459431