Cerebral palsy research news

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Interventions and Management

1. Does somatosensory discrimination therapy alter sensorimotor upper limb function differently compared to motor therapy in children and adolescents with unilateral cerebral palsy: study protocol for a randomized controlled trial

Lize Kleeren, Lisa Mailleux, Belinda McLean, Catherine Elliott, Griet Dequeker, Anja Van Campenhout, Jean-Jacques Orban de Xivry, Geert Verheyden, Els Ortibus, Katrijn Klingels, Hilde Feys

Trials. 2024 Feb 26;25(1):147. doi: 10.1186/s13063-024-07967-4.

Background: Besides motor impairments, up to 90% of the children and adolescents with unilateral cerebral palsy (uCP) present with somatosensory impairments in the upper limb. As somatosensory information is of utmost importance for coordinated movements and motor learning, somatosensory impairments can further compromise the effective use of the impaired upper limb in daily life activities. Yet, intervention approaches specifically designated to target these somatosensory impairments are insufficiently investigated in children and adolescents with uCP. Therefore, the aim of this randomized controlled trial (RCT) is to compare the effectiveness of somatosensory discrimination therapy and dose-matched motor therapy to improve sensorimotor upper limb function in children and adolescents with uCP, who experience somatosensory impairments in the upper limb. We will further explore potential behavioral and neurological predictors of therapy response. Methods: A parallel group, evaluator-blinded, phase-II, single-center RCT will be conducted for which 50 children and adolescents with uCP, aged 7 to 15 years, will be recruited. Participants will be randomized to receive 3 weekly sessions of 45 minutes of either somatosensory discrimination therapy or upper limb motor therapy for a period of 8 weeks. Stratification will be performed based on age, manual ability, and severity of tactile impairment at baseline. Sensorimotor upper limb function will be evaluated at baseline, immediately after the intervention and after 6 months follow-up. The primary outcome measure will be bimanual performance as measured with the Assisting Hand Assessment. Secondary outcomes include a comprehensive test battery to objectify somatosensory function and measures of bimanual coordination, unimanual motor function, and goal attainment. Brain imaging will be performed at baseline to investigate structural brain lesion characteristics and structural connectivity of the white matter tracts. Discussion: This protocol describes the design of an RCT comparing the effectiveness of somatosensory discrimination therapy and dose-matched motor therapy to improve sensorimotor upper limb function in children and adolescents with uCP. The results of this study may aid in the selection of the most effective upper limb therapy, specifically for children and adolescents with tactile impairments. Trial registration: ClinicalTrials.gov (NCT06006065). Registered on August 8, 2023.

PMID: 38409060

2. Measuring functional hand use in children with unilateral cerebral palsy using accelerometry and machine learning

Sunaal P Mathew, Jaclyn Dawe, Kristin E Musselman, Marina Petrevska, José Zariffa, Jan Andrysek, Elaine Biddiss

Dev Med Child Neurol. 2024 Mar 2. doi: 10.1111/dmcn.15895. Online ahead of print.

Aim: To investigate wearable sensors for measuring functional hand use in children with unilateral cerebral palsy (CP). Method: Dual wrist-worn accelerometry data were collected from three females and seven males with unilateral CP (mean age = 10 years 2 months [SD 3 years]) while performing hand tasks during video-recorded play sessions. Video observers labelled

instances of functional and non-functional hand use. Machine learning was compared to the conventional activity count approach for identifying unilateral hand movements as functional or non-functional. Correlation and agreement analyses compared the functional usage metrics derived from each method. Results: The best-performing machine learning approach had high precision and recall when trained on an individual basis (F1 = 0.896 [SD 0.043]). On an individual basis, the best-performing classifier showed a significant correlation ($r = 0.990$, $p < 0.001$) and strong agreement (bias = 0.57%, 95% confidence interval = -4.98 to 6.13) with video observations. When validated in a leave-one-subject-out scenario, performance decreased significantly (F1 = 0.584 [SD 0.076]). The activity count approach failed to detect significant differences in non-functional or functional hand activity and showed no significant correlation or agreement with the video observations. Interpretation: With further development, wearable accelerometry combined with machine learning may enable quantitative monitoring of everyday functional hand use in children with unilateral CP.

PMID: 38429991

3. Pairing taVNS and CIMT is feasible and may improve upper extremity function in infants

Kelly McGloon, Elizabeth Humanitzki, Julia Brennan, Philip Summers, Alyssa Brennan, Mark S George, Bashar W Badran, Anne R Cribb, Dorothea Jenkins, Patricia Coker-Bolt

Front Pediatr. 2024 Feb 13:12:1365767. doi: 10.3389/fped.2024.1365767. eCollection 2024.

In this study we combined non-invasive transcutaneous auricular vagal nerve stimulation (taVNS) with 40 h of constraint induced movement therapy (CIMT) in infants. All infants completed the full intervention with no adverse events. Therapists were able to maintain high treatment fidelity and reported high ratings for ease of use and child tolerance. Preliminary results show promising gains on motor outcomes: Mean QUEST increase 19.17 (minimal clinically important difference, MCID 4.89); Mean GMFM increase 13.33 (MCID 1%-3%). Infants also exceeded expectations on Goal Attainment Scores (+1). Early data is promising that taVNS paired with intensive motor CIMT is feasible, reliable, and safe in young infants with hemiplegia, and may help harness activity-dependent plasticity to enhance functional movement.

PMID: 38415207

4. Association Between Two Methods of Spinal and Pelvic Analysis Among Children With Cerebral Palsy

Mostafa S Ali, Mahmoud Usama

J Musculoskelet Neuronal Interact. 2024 Mar 1;24(1):67-72.

Objectives: Children with cerebral palsy have weak muscles, which may impair postural adjustments. These postural adjustments are required for gait and dynamic balance during the daily living activities. The aim of this study was to investigate the association between Cobb's angle and Formetric 4D surface topography system in evaluating spinal and pelvic deformity in children with cerebral palsy. Methods: One hundred children with spastic diplegia (6 to 8 years old) diagnosed as cerebral palsy participated in this study and selected from the Outpatient Clinic of Faculty of Physical Therapy. Digital x- ray and formetric analysis were used to measure spinal deformities and pelvic deviation in children with cerebral palsy. Results: There were positive correlations between Cobb's angle and formetric parameters, including trunk imbalance, lateral deviation, and pelvic tilt. Also, Formetric parameters were significant predictors of Cobb's angle, including trunk imbalance (for a one-degree increase, Cobb's angle increases by 0.227, lateral deviation (for a one-degree increase, Cobb's angle increases by 0.665), and pelvic tilt (for a one-degree increase, Cobb's angle increases by 0.252). Conclusion: Formetric 4D surface topography system was effective in evaluating spinal and pelvic deformity in children with cerebral palsy when compared with Digital x-ray.

PMID: 38427370

5. "Coronal Split/Overlap Repair" Patellar Tendon Shortening in Skeletally Immature Patients

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JBJS Essent Surg Tech. 2024 Feb 23;14(1):e23.00030. doi: 10.2106/JBJS.ST.23.00030. eCollection 2024 Jan-Mar.

Background: "Coronal split/overlap repair" patellar tendon shortening (PTS) is a technique that is utilized to treat patella alta and can be combined with distal femoral extension osteotomy (DFEO) for the treatment of crouch gait in skeletally immature patients with cerebral palsy. Description: The patellar tendon is split in the coronal plane. The ventral patellar tendon flap is released from its patellar attachment and is reflected distally over its tibial attachment, exposing a dorsal flap. Two patellar/tibial no. 5 Ethibond (Ethicon) sutures are passed through 2 crossing patellar tunnels and 2 parallel tibial tunnels. The patella is then pushed distally until its distal pole lies at the level of the tibiofemoral joint. The Ethibond sutures are tied and tensioned to the desired level. The knee should be able to be passively flexed to 90°. The intact redundant dorsal flap of the patellar tendon is imbricated. Lastly, the ventral flap is advanced proximally and sutured to the anterior surface of the patella and to the edges of the dorsal flap without shortening. A hinged knee brace is utilized postoperatively with a range of motion of 0° to 30°,

progressing to 90° by 6 weeks. No resistive quadriceps contractions are permitted for the first 3 weeks. Alternatives: Patellar tendon advancement in skeletally immature patients can be performed by releasing the tibial attachment and the free end is advanced deep to the T-shaped tibial periosteal flap1-3. Other PTS techniques can be grouped into the categories of (1) patellar tendon imbrication4, (2) patellar tendon detaching techniques in which the tendon is detached from the patellar attachment or cut in its midsubstance and shortened2,5-7, and (3) patellar tendon semi-detaching techniques in which patellar tendon flaps are created and shortened8,9. Rationale: The presently described technique is a semi-detaching technique, preserving a good part of the patellar tendon while avoiding complete dehiscence of the extensor mechanism. Moreover, the 2 patellar/tibial sutures would protect the patellar tendon repair and allow early rehabilitation and knee range-of-motion exercises. Expected outcomes: Satisfactory correction of the patella alta was reported with PTS techniques with or without DFEO to correct concomitant fixed flexion deformity in patients with cerebral palsy. Furthermore, there was reported improvement of total knee range of motion with restoration of adequate knee extension during the stance phase1,3,8. Reported complications with this technique were mainly superficial infection. Important tips: Any substantial fixed flexion deformity of the knee (>10°) should be corrected with hamstring lengthening or DFEO prior to PTS.A mid-patellar coronal split is made with use of a no.-15 blade and extended proximally and distally with use of 2 mosquito clips. To avoid difficulties with crossing of the patellar sutures, always keep the straight needle inside the 1st tunnel until the 2nd tunnel is created and its respective suture is passed. To distalize the patella, the patellar/tibial sutures are tied in a simple knot and held by a mosquito clip in order to allow retensioning until the desired patellar height is reached. The 2 patellar/tibial suture knots are slid to the proximal and distal ends of the surgical field.

PMID: 38406561

6. A preliminary study on the spasticity reduction of quadriceps after selective dorsal rhizotomy in pediatric cases of spastic cerebral palsy

Wenbin Jiang, Li Zhang, Min Wei, Rui Wang, Bo Xiao, Junlu Wang, Qijia Zhan

Acta Neurochir (Wien). 2024 Feb 26;166(1):108. doi: 10.1007/s00701-024-06010-4.

Objective: This study aimed to evaluate the potential alleviation of quadriceps spasticity in children diagnosed with spastic cerebral palsy (CP) following selective dorsal rhizotomy (SDR). Methods: A retrospective study was conducted on children suffering from spastic CP who underwent SDR at the Department of Neurosurgery, Shanghai Children's Hospital, from July 2018 to September 2020. Inclusion criteria comprised children exhibiting quadriceps spasticity exceeding modified Ashworth Scale grade 2. Muscle tone and motor function were assessed before the operation, at short-term follow-up and at the last follow-up after SDR. Additionally, intraoperative neurophysiological monitoring data were reviewed. Results: The study comprised 20 eligible cases, where, prior to surgery, 35 quadriceps muscles exhibited spasticity exceeding modified Ashworth Scale grade 2. Following short-term and mid-term follow-up, specifically an average duration of 11 ± 2 days and 1511 ± 210 days after SDR, it was observed that muscle tension in adductors, hamstrings, gastrocnemius, and soleus decreased significantly. This reduction was accompanied by a decrease in quadriceps muscle tone in 24 out of 35 muscles (68.6%). Furthermore, the study found that intraoperative electrophysiological parameters can predict postoperative spasticity relief in the quadriceps. The triggered electromyographic (EMG) output of the transected sensory root/rootlets after single-pulse stimulation revealed that the higher the EMG amplitudes in quadriceps, the greater the likelihood of postoperative decrease in quadriceps muscle tension. Conclusions: SDR demonstrates the potential to reduce muscle spasticity in lower extremities in children diagnosed with CP, including a notable impact on quadriceps spasticity even they are not targeted in SDR. The utilization of intraoperative neurophysiological monitoring data enhances the predictability of quadriceps spasticity reduction following SDR.

PMID: 38409557

7. MR-Compatible Tactile Stimulator System: Application for Individuals with Brain Injuries

Nahid KalantaryArdebily, Anna C Feldbush, Netta Gurari

Res Sq [Preprint]. 2024 Feb 15:rs.3.rs-3943267. doi: 10.21203/rs.3.rs-3943267/v1.

Accurate perception of tactile information is essential for performing activities of daily living and learning new sensorimotor skills like writing. Deficits in perceiving tactile stimuli are associated with severity in physical disability. The mechanisms contributing to tactile deficits in individuals with brain injuries remain poorly understood in part due to insufficient assessment methods. Here, we provide a tactile stimulator system for studying the neural mechanisms contributing to tactile deficits in individuals with brain injuries during functional magnetic resonance imaging (fMRI). This tactile stimulator system consists of a pneumatically-controlled inflatable and deflatable balloon that interfaces with a digit of the hand to provide small forces. The magnitude of the applied force is delivered and controlled by modifying the air pressure in the balloon. The tactile simulator provides an 8 mm diameter tactile stimulus. The device's interface at the finger is compact, allowing it to be used with individuals who have a closed-fist posture following brain injury such as stroke or cerebral palsy. The tactile stimulator contains no metallic components and can be used in MRI research. The tactile stimulator system can repeatedly apply a force between 1 N and 2.4 N. This tactile stimulator system addresses limitations in past fMRI methodologies for assessing tactile perception by providing precise and repeatable force stimuli to a small area of the finger. Custom software automates the

application of the force stimuli and permits synchronization with acquired fMRI data. This system can be used in subsequent testing to investigate deficits in sensory functioning in those with brain injuries.

PMID: 38410479

8. PedBotLab: A Novel Video Game-Based Robotic Ankle Platform Created for Therapeutic Exercise for Children With Neurological Impairments

Justine Belschner, Catherine Coley, Staci Kovelman, Tyler Salvador, Reza Monfaredi, Manon Schladen, Hadi Fooladi Talari, Eduardo A Trujillo Rivera, Kevin Cleary, Sarah Helen Evans

Phys Occup Ther Pediatr. 2024 Feb 28:1-19. doi: 10.1080/01942638.2024.2316163. Online ahead of print.

Aims: Assess the potential benefits of using PedBotLab, a clinic based robotic ankle platform with integrated video game software, to improve ankle active and passive range of motion, strength, selective motor control, gait efficiency, and balance. Methods: Ten participants with static neurological injuries and independent ambulation participated in a 10-week pilot study (Pro00013680) to assess feasibility and efficacy of PedBotLab as a therapeutic device twice weekly. Isometric ankle strength, passive and active ankle range of motion, plantarflexor spasticity, selective motor control of the lower extremity, balance, and gait speed were measured pre- and post-trial. Results: Statistically significant improvements were seen in flexibility, active range of motion, and strength in multiple planes of ankle motion. Ankle dorsiflexion with knee flexion and knee extension demonstrated statistically significant results in all outcome measures. No significant changes were observed in gait speed outcomes. Conclusions: The use of PedbotLab can lead to improvements in ankle strength, flexibility, and active range of motion for children with static neurological injuries. Future studies aim to evaluate the effect on gait quality and work toward developing a home-based device.

PMID: 38419343

9. The Etiologic Risk Factors for Cerebral Palsy at an Orthopedic Surgery Clinic in South Africa

Dane Maimin Dr, Anlume Mentz, Michaela Thomas, Tao-Mae Van Heerden, Anria Horn Dr

Pediatr Neurol. 2024 Feb 2:153:175-178. doi: 10.1016/j.pediatrneurol.2024.01.022. Online ahead of print.

Background: Cerebral palsy (CP) is a group of disorders that affect movement and posture caused by injury to the developing brain. Although prematurity and low birth weight are common causes in developed countries, birth asphyxia, kernicterus, and infections have been identified as predominant etiologies in Africa. There is, however, very little information on the etiology of CP in South Africa. We aimed to determine the etiology, severity, and topographic distribution of CP in children undergoing orthopedic surgery at our tertiary pediatric unit. Method: A retrospective folder review was performed for patients with CP who underwent orthopedic surgery from July 2018 to June 2022. Data were collected on perinatal circumstances, etiologic risk factors for developing CP, severity of disability as classified by the Gross Motor Function Classification Scale (GMFCS), and topographic distribution. Descriptive analysis was performed. Results: A total of 202 patients were included in the analysis. Prematurity (gestational age less than 37 weeks) was noted in 41.6% of the cohort and was the most common risk factor. Hypoxic-ischemic encephalopathy (30.7%), postnatal infections (13.4%), congenital brain malformations (10.4%), and cerebral infections were the next most common etiologic risk factors. Forty-eight percent of patients were classified as GMFCS IV or V. There was a predominance of bilateral (69.5%) compared with unilateral (21.3%) subtypes. Conclusion: Most patients undergoing orthopedic surgery for musculoskeletal sequelae of CP had GMFCS levels of IV or V and were bilateral subtypes, emphasizing the need for intervention at a primary care level to decrease the incidence of this frequently preventable condition.

PMID: 38412782

10. Role of telerehabilitation in the rehabilitation of children with cerebral palsy during COVID-19: A review

Muhammad Kashif, Abdulaziz Albalwi, Syed Abid Mehdi Kazmi, Ahmad A Alharbi, Kiran Bashir, Muhammad Aqeel Aslam, Tamjeed Ghaffar

Review Medicine (Baltimore). 2024 Mar 1;103(9):e37214. doi: 10.1097/MD.0000000000037214.

Individuals with cerebral palsy (CP) have limited mobility and are unable to actively participate in tasks that are part of their daily living. Thus, continuous therapeutic sessions are required to keep such individuals active and engaged in the environment. Due to the coronavirus disease of 2019 (COVID-19) lockdowns, rehabilitation for children with CP was inhibited which consequently put them at risk of losing their functional gains which were obtained through previous in-person therapies. In order to avoid this, an alternate to conventional therapy was required and this rendered it necessary to review the role of telerehabilitation (TR) and its various modes for the rehabilitation of children with CP. This study aimed to explore the effectiveness of TR for children with CP during COVID-19 through the present literature and to determine if TR is an alternate

to conventional physical therapy in children with CP during the coronavirus outbreak. This scoping review was conducted by searching different databases such as PubMed, Cochrane Collaboration, Medline, and Google Scholar on the basis of inclusion criteria. Screening was performed from January 2019 to June 2022 and the initial screening attempt returned 469 studies. After applying the aforementioned criteria, all impertinent studies were excluded which resulted in 28 studies being included for this review as they contained information about the effectiveness of TR on children with CP during COVID-19. These 28 articles included randomised controlled trials, surveys, reviews, clinical trials, case reports, prospective studies, editorials, and longitudinal studies. Three out of the 7 randomised controlled trial studies revealed that action observation treatment can be a useful approach for TR in child with CP during similar pandemics. The other 3 studies supported the use of computer-based games, robots, nonimmersive virtual reality, and wearable haptic devices as a significant means of TR in child with CP as an alternate to routine therapy during COVID-19. TR is an affable mode of rehabilitation specifically for the pediatric population. In the future, it can be an alternate to routine therapy for those who are unlikely to get daily access to in-person therapeutic sessions due to various reasons or circumstances.

PMID: 38428904

11. Qualitative feedback from caregivers in a multidisciplinary pediatric neuromuscular clinic

Skylar M Hess, Dorothy Adu-Amankwah, Cordelia R Elaiho, Liam R Butler, Sheena C Ranade, Brijen J Shah, Kristin Shadman, Robert Fields, Elaine P Lin

J Pediatr Rehabil Med. 2024 Feb 24. doi: 10.3233/PRM-230011. Online ahead of print.

Purpose: This study explored family satisfaction and perceived quality of care in a pediatric neuromuscular care clinic to assess the value of the multidisciplinary clinic (MDC) model in delivering coordinated care to children with neuromuscular disorders, such as cerebral palsy. Methods: Caregivers of 22 patients were administered a qualitative survey assessing their perceptions of clinic efficiency, care coordination, and communication. Surveys were audio-recorded and transcribed. Thematic analysis was completed using both deductive and inductive methods. Results: All caregivers reported that providers adequately communicated next steps in the patient's care, and most reported high confidence in caring for the patient as a result of the clinic. Four major themes were identified from thematic analysis: Care Delivery, Communication, Care Quality, and Family-Centeredness. Caregivers emphasized that the MDC model promoted access to care, enhanced efficiency, promoted provider teamwork, and encouraged shared care planning. Caregivers also valued a physical environment that was suitable for patients with complex needs. Conclusion: This study demonstrated that caregivers believed the MDC model was both efficient and convenient for pediatric patients with neuromuscular disorders. This model has the potential to streamline medical care and can be applied more broadly to improve care coordination for children with medical complexity.

PMID: 38427510

12. Effectiveness of simple and basic home-based exercise programs including pediatric massage executed by caregivers at their homes in the management of children with spastic cerebral palsy: A randomized controlled trial

Qamar Mahmood, Shaista Habibullah, Hazrat Ullah Aurakzai

J Pediatr Rehabil Med. 2024 Mar 1. doi: 10.3233/PRM-220135. Online ahead of print.

Purpose: This study aimed to assess the effectiveness of simple and basic home-based exercise programs (HEPs), including pediatric massage (PM), executed by caregivers at their homes in the management of children with spastic cerebral palsy (CP). Methods: Sixty-eight children with spastic CP (diplegia) aged 4-12 years were randomly assigned to PM and HEP groups for a randomized controlled trial continuing from November 01, 2021 to June 2022. Parents provided home-based exercises to both groups, five times a week for 12 weeks. However, the PM group was additionally provided with PM. Modified Ashworth Scale (MAS), Gross Motor Function Measure (GMFM-88) and Gross Motor Function Classification System (GMFCS) were used for evaluation of spasticity and gross motor activity at baseline as well as after six and 12 weeks of intervention. Comparative analysis of data was carried out with SPSS-20. Results: Mean age in HEP and PM groups was 6.65±2.12 and 7.09±2.22 years respectively. Data revealed homogeneity of both groups at the beginning of study. The PM group showed a statistically significant decrease in MAS scores after six and 12 weeks of intervention ($p < 0.05$) when compared with the HEP group, but similar changes did not happen in GMFM scores and GMFCS levels. However, comparative analysis revealed statistically significant change in GMFM scores and GMFCS levels ($p < 0.05$) when compared from baseline to 12 weeks of intervention in both groups. Conclusion: PM along with HEPs can be used effectively to reduce spasticity and to improve gross motor ability if performed for a period of at least six and 12 weeks respectively. In conjunction with HEPs, PM has better outcomes in the management of tone and movement disorders of spastic CP than HEPs alone.

PMID: 38427509

13. Chronic constipation in people with intellectual disabilities in the community: cross-sectional study

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BJPsych Open. 2024 Mar 1;10(2):e55. doi: 10.1192/bjo.2024.12.

Background: One-third to half of people with intellectual disabilities suffer from chronic constipation (defined as two or fewer bowel movements weekly or taking regular laxatives three or more times weekly), a cause of significant morbidity and premature mortality. Research on risk factors associated with constipation is limited. Aims: To enumerate risk factors associated with constipation in this population. Method: A questionnaire was developed on possible risk factors for constipation. The questionnaire was sent to carers of people with intellectual disabilities on the case-loads of four specialist intellectual disability services in England. Data analysis focused on descriptively summarising responses and comparing those reported with and without constipation. Results: Of the 181 people with intellectual disabilities whose carers returned the questionnaire, 42% reported chronic constipation. Constipation was significantly associated with more severe intellectual disability, dysphagia, cerebral palsy, poor mobility, polypharmacy including antipsychotics and antiseizure medication, and the need for greater toileting support. There were no associations with age or gender. Conclusions: People with intellectual disabilities may be more vulnerable to chronic constipation if they are more severely intellectually disabled. The associations of constipation with dysphagia, cerebral palsy, poor mobility and the need for greater toileting support suggests people with intellectual disabilities with significant physical disabilities are more at risk. People with the above disabilities need closer monitoring of their bowel health. Reducing medication to the minimum necessary may reduce the risk of constipation and is a modifiable risk factor that it is important to monitor. By screening patients using the constipation questionnaire, individualised bowel care plans could be implemented.

PMID: 38425039

14. Risk Factors and Outcomes for Cerebral Palsy With Hypoxic-Ischemic Brain Injury Patterns Without Documented Neonatal Encephalopathy

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Neurology. 2024 Mar 26;102(6):e208111. doi: 10.1212/WNL.0000000000208111. Epub 2024 Feb 29.

Background and objectives: Perinatal hypoxic-ischemic brain injury is a leading cause of term-born cerebral palsy, the most common lifelong physical disability. Diagnosis is commonly made in the neonatal period by the combination of neonatal encephalopathy (NE) and typical neuroimaging findings. However, children without a history of neonatal encephalopathy may present later in childhood with motor disability and neuroimaging findings consistent with perinatal hypoxic-ischemic injury. We sought to determine the prevalence of such presentations using the retrospective viewpoint of a large multiregional cerebral palsy registry. Methods: Patient cases were extracted from the Canadian Cerebral Palsy Registry with gestational age >36 weeks, an MRI pattern consistent with hypoxic-ischemic injury (HII, acute total, partial prolonged, or combined), and an absence of postnatal cause for HII. Documentation of NE was noted. Maternal-fetal risk factors, labor and delivery, neonatal course, and clinical outcome were extracted. Comparisons were performed using $\chi 2$ tests and multivariable logistic regression with multiple imputation. Propensity scores were used to assess for bias. Results: Of the 170 children with MRI findings typical for HII, 140 (82.4%, 95% confidence interval [CI] 75.7%-87.7%) had documented NE and 29 (17.0%, 95% CI 11.7%-23.6%) did not. The group without NE had more abnormalities of amniotic fluid volume (odds ratio [OR] 15.8, 95% CI 1.2-835), had fetal growth restriction (OR 4.7, 95% CI 1.0-19.9), had less resuscitation (OR 0.03, 95% CI 0.007-0.08), had higher 5-minute Apgar scores (OR 2.2, 95% CI 1.6-3.0), were less likely to have neonatal seizures (OR 0.004, 95% CI 0.00009-0.03), and did not receive therapeutic hypothermia. MRI was performed at a median 1.1 months (interquartile range [IQR] 0.67-12.8 months) for those with NE and 12.2 months (IQR 6.6-25.9) for those without ($p = 0.011$). Patterns of injury on MRI were seen in similar proportions. Hemiplegia was more common in those without documented NE (OR 5.1, 95% CI 1.5-16.1); rates of preserved ambulatory function were similar. Discussion: Approximately one-sixth of term-born children with an eventual diagnosis of cerebral palsy and MRI findings consistent with perinatal hypoxic-ischemic brain injury do not have documented neonatal encephalopathy, which was associated with abnormalities of fetal growth and amniotic fluid volume, and a less complex neonatal course. Long-term outcomes seem comparable with their peers with encephalopathy. The absence of documented neonatal encephalopathy does not exclude perinatal hypoxic-ischemic injury, which may have occurred antenatally and must be carefully evaluated with MRI.

PMID: 38422458

15. Opening Pressure and Post-Lumbar Puncture Headache in Children Undergoing Intrathecal Baclofen Trial

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J Child Neurol. 2024 Feb 28:8830738241233782. doi: 10.1177/08830738241233782. Online ahead of print.

Aims: Post-lumbar puncture headache occurs in 5% to 12% of children. The purpose of this study was to determine the frequency and predictors of post-lumbar puncture headache in children with hypertonia undergoing lumbar puncture for intrathecal baclofen trial. Methods: This was a retrospective single-center review of all 43 children (<18 years) with hypertonia and/or dyskinesia undergoing intrathecal baclofen trial from 2013-2022. Predictors of post-lumbar puncture headache were evaluated via 2-way paired t test and Fisher exact test. Results: Seven subjects (16.3%) developed post-lumbar puncture headache. Of patients who developed post-lumbar puncture headache, 3 required emergency care or hospitalization. One was misdiagnosed with constipation. The 16 patients without opening pressure measured were excluded from subsequent analyses. Of the 27 patients with documented opening pressure, the mean opening pressure was 24.0 cm H2O (SD 6.5) and 5 (18.5%) had elevated opening pressure (>28 cm H2O). Mean opening pressure was higher for those with post-lumbar puncture headache (28.6 vs 22.4 cm H2O, P = .014). Sixty percent of patients with elevated opening pressure developed post-lumbar puncture headache. Baclofen pumps were placed in 4 (80%) patients with elevated opening pressure and 6 (85.7%) with post-lumbar puncture headaches without complications. Interpretation: The risk of post-lumbar puncture headache after intrathecal baclofen trial was higher than reported in the literature, likely because of greater rates of elevated opening pressure. Physicians may use opening pressure to predict risk for post-lumbar puncture headache and should educate families about symptoms. Elevated opening pressure or post-lumbar puncture headache may not preclude baclofen pump placement.

PMID: 38419482