Cerebral Palsy ALLIANCE

NEWS
Cerebral Palsy Research

Monday 22 September 2014

Interventions and Management

1. J Bone Joint Surg Am. 2014 Sep 17;96(18):1527-34. doi: 10.2106/JBJS.M.01000.

Recurrence of hip instability after reconstructive surgery in patients with cerebral palsy.

Bayusentono S1, Choi Y2, Chung CY2, Kwon SS2, Lee KM2, Park MS2.

BACKGROUND: Hip instability can cause major problems in children with cerebral palsy, although good outcomes of hip reconstructive surgery for hip instability have been reported. In the present study, we investigated the recurrence of hip instability after reconstructive surgery and the factors influencing this recurrence in patients with cerebral palsy. METHODS: We examined consecutive patients with hip instability related to cerebral palsy who had undergone hip reconstructive surgery including femoral varus derotational osteotomy. The neck-shaft angle, head-shaft angle, and migration percentage were measured at each postoperative follow-up evaluation. For each Gross Motor Function Classification System (GMFCS) level, annual changes in radiographic indices were adjusted for multiple factors with use of a linear mixed model, with sex as the fixed effect and laterality and each subject as the random effects. RESULTS: A total of 144 hips (seventy-six patients) were included in this study, and 845 radiographs were evaluated. The GMFCS level was II or III for twelve patients, IV for thirty, and V for thirty-four. The neck-shaft angle showed no significant change in the patients with GMFCS level II or III ($p = 0.425$), IV ($p = 0.106$), or V ($p = 0.972$). The head-shaft angle showed a significant change in those with GMFCS level IV ($p = 0.008$) but not in those with level II or III ($p = 0.201$) or V ($p = 0.591$). The migration percentage did not change significantly in patients with GMFCS level II or III ($p = 0.742$), but it increased significantly by 2.0% per year ($p < 0.001$) in patients with GMFCS level IV and by 3.5% per year ($p = 0.003$) in those with level V. CONCLUSIONS: Periodic monitoring and follow-up for the recurrence of hip instability is important in patients with cerebral palsy and a GMFCS level of IV or V.

LEVEL OF EVIDENCE: Prognostic Level IV. See Instructions for Authors for a complete description of levels of evidence.

PMID: 25232076 [PubMed - in process]

2. Eur J Paediatr Neurol. 2014 Aug 30. pii: S1090-3798(14)00138-X. doi: 10.1016/j.ejpn.2014.08.001. [Epub ahead of print]

Gait evolution in a family with hereditary spastic paraplegia.

Armand S1, Turcot K2, Bonnefoy-Mazure A2, Lascombes P3, De Coulon G3.

BACKGROUND: The degree of disability in patients with hereditary spastic paraplegia has been reported variable even in members of the same family (same gene mutation). Moreover, it has been established that patients with hereditary spastic paraplegia should be treated differently from cerebral palsy patients due to the progressive nature of this disease. However, the gait evolution of hereditary spastic paraplegia showing onset symptoms at an early age has been described as stable. Therefore, this study aims to evaluate the walking ability and the influence of treatments on gait evolution in a family with hereditary spastic paraplegia. METHODS: Clinical gait analyses were performed in six hereditary spastic paraplegia patients from the same family with a follow-up of 4-15 years. RESULTS: Based on the gait deviation index, results showed a large variation of walking ability in these patients and no statistical difference between the first and last examination. In fact, three patients have improved their gait (from childhood to adolescence) whereas three patients worsened their gait. CONCLUSIONS: Gait alterations in a family with hereditary spastic paraplegia are heterogeneous. Gait evolution in hereditary spastic paraplegia with early symptoms had a tendency to improve gait until adolescence with adapted treatments and to decline in the adulthood.

PMID: 25218933 [PubMed - as supplied by publisher]

3. Praxis (Bern 1994). 2014 Sep 1;103(19):1133-9. doi: 10.1024/1661-8157/a001783.

In Process Citation [Article in German]

Haefeli M, Calcagni M.

Spastic hemiplegia and cerebral palsy often lead to typical deformities of the upper extremity. Muscle- and joint-contractures may be painful and aesthetically unappealing and may interfere with function and hygiene. Within the first weeks after the cerebral incidence the vital threat is dominating and the exact amount of neurologic impairment is not assessable. During this period, conservative treatment should counteract the development of contractures. After spontaneous neurologic recovery, surgical options should be taken into account. When choosing surgical procedures, factors as volitional motor control, sensibility and cognition must be taken into account besides the morphologic changes. This is best achieved in a multidisciplinary setting of neurologists, rehabilitation specialists, physiotherapists and surgeons.

PMID: 25228575 [PubMed - in process]

4. Zhen Ci Yan Jiu. 2014 Aug;39(4):318-23.

Randomized controlled clinical trials of individualized treatment of cerebral palsy children by warm-reinforcing needling combined with Bobath rehabilitation training [Article in Chinese]

Zhang NX, Wang XY, Liu GZ, Li YB, Zhang HY.

OBJECTIVE: To observe the effect of warm-reinforcing needling combined with modern rehabilitation training on motor function of cerebral palsy (CP) children. METHODS: Sixty cases of CP children were randomly divided into acupuncture combined with rehabilitation (Acu + Rehab, n = 30) group and Rehab (n = 30) group. Patients of the Acu + Rehab group were treated by warm-reinforcing needling stimulation of Jiaji (EX-B 2), Jianyu (LI 15), Quchi (LI 11), Hegu (LI 4), Zusanli (ST 36), Yinlingquan (GB 34), Sanyinjiao (SP 6), Juegu (GB 39), Yanglingquan (GB 34), etc., combined with Bobath rehabilitation therapy, and those of the Rehab group treated by Bobath rehabilitation (stimulating key control points in the body, triggering reflexes that provide head and body control). The treatment was conducted every day,with three months being a therapeutic course,two courses in all. The Peabody Developmental Motor Scales 2 (PDMS-2) was used to evaluate the CP children's motor function [1) gross motor:

posture (straightness ratio), locomotion and object manipulation; 2) fine motor: grasping and visual-Motor integration]. RESULTS: After the treatment, of the 30 and 30 cases in the Acu+ Rehab and Rehab groups, 1 (3.33%) and 0 (0%) were cured, 20 (66.67%) and 18 (60.00%) experienced marked improvement, 9 (30.00%) and 12 (40.00%) were invalid, with the effective rates being 70.00% and 60.00% respectively. The therapeutic effect of the Acu + Rehab group was markedly superior to that of the Rehab group ($P < 0.05$). After 6 months ' treatment, the scores of posture, locomotor, object manipulation and grasping, and visual-movement integration were significantly increased in comparison with pre-treatment in the same one group ($P < 0.05$), and the effects of the Acu + Rehab group were obviously superior to those of Rehab group in increasing the scores of posture, locomotor, object manipulation and grasping after 6 months' treatment ($P < 0.05$). CONCLUSION: Warm-reinforcing needling combined with Bobath rehabilitation has a better therapeutic effect in improving gross motor and fine motor functions of CP children.

PMID: 25219129 [PubMed - in process]

5. Biomed Mater Eng. 2014 Jan 1;24(6):3613-8. doi: 10.3233/BME-141188.

Effects of innovative virtual reality game and EMG biofeedback on neuromotor control in cerebral palsy.

Yoo JW1, Lee DR2, Sim YJ1, You JH1, Kim CJ3.

Sensorimotor control dysfunction or dyskinesia is a hallmark of neuromuscular impairment in children with cerebral palsy (CP), and is often implicated in reaching and grasping deficiencies due to a neuromuscular imbalance between the triceps and biceps. To mitigate such muscle imbalances, an innovative electromyography (EMG)-virtual reality (VR) biofeedback system were designed to provide accurate information about muscle activation and motivation. However, the clinical efficacy of this approach has not yet been determined in children with CP. The purpose of this study was to investigate the effectiveness of a combined EMG biofeedback and VR (EMG-VR biofeedback) intervention system to improve muscle imbalance between triceps and biceps during reaching movements in children with spastic CP. Raw EMG signals were recorded at a sampling rate of 1,000 Hz, band-pass filtered between 20-450 Hz, and notch-filtered at 60 Hz during elbow flexion and extension movements. EMG data were then processed using MyoResearch Master Edition 1.08 XP software. All participants underwent both interventions consisting of the EMG-VR biofeedback combination and EMG biofeedback alone. EMG analysis resulted in improved muscle activation in the underactive triceps while decreasing overactive or hypertonic biceps in the EMG-VR biofeedback compared with EMG biofeedback. The muscle imbalance ratio between the triceps and biceps was consistently improved. The present study is the first clinical trial to provide evidence for the additive benefits of VR intervention for enhancing the upper limb function of children with spastic CP.

PMID: 25227075 [PubMed - in process]

6. Phys Occup Ther Pediatr. 2014 Sep 18. [Epub ahead of print]

Determinants of Developmental Gain in Daily Activities in Young Children with Cerebral Palsy.

Kruijsen-Terpstra AJ1, Ketelaar M, Verschuren O, Smits DW, Jongmans MJ, Gorter JW.

The aim of this study was to examine which child and family characteristics at the child's age of 2 years are determinants of development of self-care and mobility activities over a period of 2 years in young children with cerebral palsy (CP). Longitudinal data of 92 children, representing all levels of the Gross Motor Function Classification System (GMFCS), were analyzed. Children's self-care and mobility activities were assessed with the Functional Skills Scale of the Pediatric Evaluation of Disability Inventory. Development of self-care and mobility activities was related to several child determinants but no family determinants. GMFCS, type of CP, intellectual capacity, and epilepsy were related to the development of self-care and mobility activities, while manual ability and spasticity were related to development of mobility activities. Multivariate analysis indicated that GMFCS and intellectual capacity were the strongest determinants of development of self-care activities, and GMFCS was the strongest determinant of development of mobility activities. The change in self-care and mobility activities was less favorable in severely affected children with severe disability. Knowledge of GMFCS level and intellectual capacity is important in anticipating change over time and goal setting in young children with CP.

PMID: 25232647 [PubMed - as supplied by publisher]

7. Augment Altern Commun. 2014 Sep 17:1-15. [Epub ahead of print]

A Metasynthesis of Patient-Provider Communication in Hospital for Patients with Severe Communication Disabilities: Informing New Translational Research.

Hemsley B1, Balandin S.

Poor patient-provider communication in hospital continues to be cited as a possible causal factor in preventable adverse events for patients with severe communication disabilities. Yet to date there are no reports of empirical interventions that investigate or demonstrate an improvement in communication in hospital for these patients. The aim of this review was to synthesize the findings of research into communication in hospital for people with severe communication disabilities arising from lifelong and acquired stable conditions including cerebral palsy, autism, intellectual disability, aphasia following stroke, but excluding progressive conditions and those solely related to sensory impairments of hearing or vision. Results revealed six core strategies suggested to improve communication in hospital: (a) develop services, systems, and policies that support improved communication, (b) devote enough time to communication, (c) ensure adequate access to communication tools (nurse call systems and communication aids), (d) access personally held written health information, (e) collaborate effectively with carers, spouses, and parents, and (f) increase the communicative competence of hospital staff. Currently there are no reports that trial or validate any of these strategies specifically in hospital settings. Observational and evaluative research is needed to investigate the ecological validity of strategies proposed to improve communication.

PMID: 25229213 [PubMed - as supplied by publisher]

8. J Clin Psychol Med Settings. 2014 Sep 17. [Epub ahead of print]

Caregiving Burden and Parent-Child Quality of Life Outcomes in Neurodevelopmental Conditions: The Mediating Role of Behavioral Disengagement.

Carona C1, Silva N, Crespo C, Canavarro MC.

The aim of this study was to analyze the direct and indirect effects, via parents' behavioral disengagement coping, of caregiving burden on the quality of life (QL) of parents and their children with neurodevelopmental conditions. Self-completion questionnaires on the target variables were administered to a sample of 156 parents who had a child with a neurodevelopmental condition, namely epilepsy (n = 65) and cerebral palsy (n = 91). Structural equation modeling was used to test a mediation model and ascertain direct and indirect effects among study variables. Significant direct effects of caregiving burden on parents' and their children's QL were found. Additionally, caregiving burden had a significant indirect effect on parents' QL, via behavioral disengagement, but not on their children's QL. Finally, this model was found to be invariant across conditions and patients' age groups. Caregiving burden may be elected as a strategic intervention target to improve parent-child QL outcomes in neuropediatric settings. Parents should be encouraged to avoid or reduce behavioral disengagement coping in relation to their caregiving stress, and alternatively adopt active coping strategies that may positively affect their children's QL and impede or attenuate the deleterious effects of caregiving burden on their own QL.

PMID: 25228103 [PubMed - as supplied by publisher]

Prevention and Cure

9. Am J Obstet Gynecol. 2014 Sep 12. pii: S0002-9378(14)00958-2. doi: 10.1016/j.ajog.2014.09.016. [Epub ahead of print]

Inflammatory predictors of neurologic disability after preterm premature rupture of membranes.

Armstrong-Wells J1, Donnelly M2, Post MD3, Manco-Johnson MJ4, Winn VD2, Sébire G5.

OBJECTIVE(S): The maternal-fetal inflammatory response contributes to both preterm premature rupture of membranes (PPROM) and adverse neurological outcomes. Additionally, cytokines associated with fetal placental inflammation can be detrimental to brain development regardless of inciting infection. We investigated whether differential patterns of cytokine markers in maternal and fetal plasma samples reflect subtypes of placental inflammation and neurological outcomes at 6 months in infants born to mothers with PPROM. STUDY DESIGN: Within a prospective cohort study of 25 women with PPROM, plasma cytokines (IL-1ß, IL-6, IL-8, and TNF-a) were measured by ELISA from maternal blood samples at rupture and delivery, and from fetal umbilical cord blood samples. Patterns of cytokine expression were correlated with specific placenta pathologies. Infants underwent cranial ultrasound after birth and standardized neurological examinations at 6 months corrected gestational age. Predictors of inflammation and adverse neurological outcome were assessed by logistic regression, adjusting for gestational age at birth. RESULTS: Inflammation of the fetal side of the placenta was associated with elevated maternal IL-6 and IL-8 at delivery and fetal IL-1ß, IL-6, IL-8, and TNF-a. Worse neurological outcome at 6 months was associated with inflammation of the fetal side of the placenta and shorter duration from rupture of membrane to delivery, independent of gestational age at birth or cranial ultrasound results. CONCLUSION(S): Our findings support the connection between fetal inflammation with adverse neurological outcome with PPROM, regardless of cranial ultrasound results. Further longitudinal studies are needed to adequately examine these patterns, and will aid in risk assessment and intervention strategies.

PMID: 25223243 [PubMed - as supplied by publisher]

10. J Perinat Med. 2014 Sep 13. pii: /j/jpme.ahead-of-print/jpm-2014-0158/jpm-2014-0158.xml. doi: 10.1515/jpm-2014-0158. [Epub ahead of print]

Disparity in post-treatment maternal circulating magnesium sulfate levels between twin and singleton gestation: Is this the missing link between plurality and adverse outcome?

Marom-Haham L, Mazaki-Tovi S, Zilberman I, Kalter A, Haas J, Sivan E, Schiff E, Yinon Y.

Objective: Magnesium sulfate (MgSO4) administered to women at risk for preterm delivery decreases the risk of cerebral palsy in their children. However, the neuroprotective effect of MgSO4 has not been shown in twin gestations. Thus, the aim of this study was to determine the maternal serum levels of magnesium in twin vs. singleton pregnancies following intravenous treatment of MgSO4. Methods: Case control study including two groups of pregnant women who received intravenous MgSO4: (1) twin gestations (n=83) and (2) singleton pregnancies (n=83). Maternal serum magnesium levels 6 and 24 h after initiation of treatment were determined in both groups. Results: Maternal serum levels of magnesium were significantly lower among patients with twin gestations compared to those with singleton ones 6 h after initiation of treatment (4.6 vs. 4.8 mg/dL, P=0.003). In addition, the rate of pregnant women who obtained therapeutic levels 6 h after initiation of treatment was significantly lower in twin gestations than in singleton ones (36% vs. 58%, P=0.008). Multiple regression analysis revealed that twin gestations were independently and significantly associated with low maternal serum magnesium levels. Conclusions: Maternal serum concentrations of magnesium are lower in twin pregnancies than in singleton ones following MgSO4 treatment, which might explain the decreased neuroprotective effect of MgSO4 reported in twin pregnancies.

PMID: 25222591 [PubMed - as supplied by publisher]

11. JAMA. 2014 Sep 17;312(11):1105-13. doi: 10.1001/jama.2014.11189.

School-age outcomes of very preterm infants after antenatal treatment with magnesium sulfate vs placebo.

Doyle LW1, Anderson PJ2, Haslam R3, Lee KJ4, Crowther C5; Australasian Collaborative Trial of Magnesium Sulphate (ACTOMgSO4) Study Group. Collaborators (29)

IMPORTANCE: Antenatal magnesium sulfate given to pregnant women at imminent risk of very preterm delivery reduces the risk of cerebral palsy in early childhood, although its effects into school age have not been reported from randomized trials. OBJECTIVE: To determine the association between exposure to antenatal magnesium sulfate and neurological, cognitive, academic, and behavioral outcomes at school age. DESIGN, SETTING, AND PARTICIPANTS: The ACTOMgSO4 was a randomized clinical trial conducted in 16 centers in Australia and New Zealand, comparing magnesium sulfate with placebo given to pregnant women (n=535 magnesium; n=527 placebo) for whom imminent birth was planned or expected before 30 weeks' gestation. Children who survived from the 14 centers who participated in the school-age follow-up (n=443 magnesium; n=424 placebo) were invited for an assessment at 6 to 11 years of age between 2005 and 2011. MAIN OUTCOMES AND MEASURES: Mortality, cerebral palsy, motor function, IQ, basic academic skills, attention and executive function, behavior, growth, and functional outcomes. Main analyses were imputed for missing data. RESULTS: Of the 1255 fetuses known to be alive at randomization, the mortality rate to school age was 14% (88/629) in the magnesium sulfate group and 18% (110/626) in the placebo group (risk ratio [RR], 0.80; 95% CI, 0.62-1.03, P=.08). Of 867 survivors available for follow-up, outcomes at school age (corrected age 6-11 years) were determined for 669 (77%). Comparing the magnesium sulfate and placebo groups revealed no statistically significant difference in proportions with cerebral palsy (23/295 [8%] and 21/314 [7%], respectively; odds ratio [OR], 1.26; 95% CI, 0.84-1.91; P=.27) or abnormal motor function (80/297 [27%] and 80/300 [27%], respectively; OR, 1.16; 95% CI, 0.88-1.52; P=.28). There was also little difference between groups on any of the cognitive, behavioral, growth, or functional outcomes. CONCLUSIONS AND RELEVANCE: Magnesium sulfate given to pregnant women at imminent risk of birth before 30 weeks' gestation was not associated with neurological, cognitive, behavioral, growth, or functional outcomes in their children at school age, although a mortality advantage cannot be excluded. The lack of long-term benefit requires confirmation in additional studies.

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