

Monday 19 April 2010

This free weekly bulletin lists the latest research on cerebral palsy (CP), as indexed in the NCBI, PubMed (Medline) and Entrez (GenBank) databases. These articles were identified by a search using the key term "cerebral palsy".

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## Interventions

### 1. Prosthet Orthot Int. 2010 Apr 13. [Epub ahead of print]

#### **A systematic review to determine best practice reporting guidelines for AFO interventions in studies involving children with cerebral palsy.**

Ridgwell E, Dobson F, Bach T, Baker R.

National Centre for Prosthetics and Orthotics, La Trobe University, Bundoora.

Studies which have examined the effects of ankle-foot orthoses (AFOs) on children with cerebral palsy (CP) often report insufficient detail about the participants, devices and testing protocols. The aim of this systematic review was to evaluate the level and quality of detail reported about these factors in order to generate best practice guidelines for reporting of future studies. A systematic search of the literature was conducted to identify studies which examined any outcome measure relating to AFO use in children with CP. A customized checklist was developed for data extraction and quality assessment. There was substantial variability in the level and quality of detail reported across the 41-paper yield. Many papers reported insufficient detail to allow synthesis of outcomes across studies. The findings of this review have been used to generate guidelines for best practice of reporting for AFO intervention studies. It is important to ensure homogeneity of gait pattern in a subject sample or to subdivide a sample to investigate the possibility that heterogeneity affected results. It is also important to describe the orthosis in sufficient detail that the device can be accurately replicated because differences in designs have been shown to affect outcomes. These guidelines will help researchers provide more systematic and detailed reports and thereby permit future reviewers to more accurately assess both the reporting and quality of orthotic interventions, and will facilitate synthesis of literature to enhance the evidence base.

PMID: 20384548 [PubMed - as supplied by publisher]

### 2. Spine (Phila Pa 1976). 2010 Apr 13. [Epub ahead of print]

#### **Spinal Fusion for Spastic Neuromuscular Scoliosis: Is Anterior Releasing Necessary When Intraoperative Halo-Femoral Traction Is Used?**

Keeler KA, Lenke LG, Good CR, Bridwell KH, Sides B, Luhmann SJ.

From the Department of Orthopaedic Surgery, WA University School of Medicine, St. Louis, MO.

STUDY DESIGN: Retrospective radiographic and clinical study. OBJECTIVE: To compare the complications and radiographic outcomes of 2 types of surgical treatments, posterior-only fusion and circumferential fusion, in patients with nonambulatory quadriplegic cerebral palsy treated with adjunctive intraoperative halo-femoral traction. SUMMARY OF BACKGROUND DATA: Circumferential anterior-posterior spinal fusion (A/PSF) has been used to improve deformity correction and rate of fusion in patients with neuromuscular scoliosis (NMS) but is associated

with increased morbidity. Anterior procedures may increase operative time (OR time) and estimated blood loss (EBL) as well as compromise pulmonary function. Posterior-only spinal fusion (PSF-only) may be sufficient, thereby forgoing the need for the anterior approach without sacrificing deformity correction or outcome. **METHODS:** Twenty-six patients (age <21 years) who underwent PSF-only for spastic NMS (quadriplegic cerebral palsy) were matched with a comparison cohort of 26 patients who underwent A/PSF (11 staged, 15 same day). All posterior fusions extended from the proximal thoracic spine (T2/T3) to the pelvis. Anterior fusions used a thoracoabdominal approach. All 52 patients underwent intraoperative halo-femoral traction. Mean follow-up for PSF-only was 2.9 years and A/PSF 3.3 years. **RESULTS:** There were no significant differences between the 2 groups in demographic data or preoperative radiographic measures. The PSF-only group had statistically significant shorter OR time (6.1 vs. 10.3 hours), lower EBL (873 vs. 1361 mL), lower frequency of postoperative intubation (38% vs. 81%), shorter length of postoperative intubation (2 vs. 6.5 days), and lower frequency of postoperative pulmonary complications (7.7% vs. 26.9%). There were no statistically significant differences at the final follow-up for thoracolumbar/lumbar curve Cobb, % correction of thoracolumbar/lumbar Cobb, pelvic obliquity, C7 plumb line and the center sacral vertical line, sagittal T5-T12, sagittal T10-L2, and sagittal T12-S1 Cobb measurements. There were no halo-femoral traction-related complications. **CONCLUSIONS:** When intraoperative halo-femoral traction is used, PSF-only surgery for NMS can provide excellent curve correction and spinal balance. In this study, the PSF-only group had shorter OR time, lower EBL, lower frequency of postoperative intubation, and fewer cases of pneumonias when compared with A/PSF with similar radiographic outcomes at 2-year follow-up.

PMID: 20393384 [PubMed - as supplied by publisher]

### 3. J Biomech. 2010 Apr 7. [Epub ahead of print]

#### Variation of hamstrings lengths and velocities with walking speed.

Agarwal-Harding KJ, Schwartz MH, Delp SL.

Departments of Mechanical Engineering and Bioengineering, Stanford University, Clark Center, Room S-321, Mail Code 5450, 318 Campus Drive, Stanford, CA 94305-5450, USA.

Crouch gait, one of the most prevalent movement abnormalities among children with cerebral palsy, is frequently treated with surgical lengthening of the hamstrings. To assist in surgical planning many clinical centers use musculoskeletal modeling to help determine if a patient's hamstrings are shorter or lengthen more slowly than during unimpaired gait. However, some subjects with crouch gait walk slowly, and gait speed may affect peak hamstring lengths and lengthening velocities. The purpose of this study was to evaluate the effects of walking speed on hamstrings lengths and velocities in a group of unimpaired subjects over a large range of speeds and to determine if evaluating subjects with crouch gait using speed matched controls alters subjects' characterization as having "short" or "slow" hamstrings. We examined 39 unimpaired subjects who walked at five different speeds. These subjects served as speed-matched controls for comparison to 74 subjects with cerebral palsy who walked in crouch gait. Our analysis revealed that peak hamstrings length and peak lengthening velocity in unimpaired subjects increased significantly with increasing walking speed. Fewer subjects with cerebral palsy were categorized as having hamstrings that were "short" (31/74) or "slow" (38/74) using a speed-matched control protocol compared to a non-speed-matched protocol (35/74 "short", 47/74 "slow"). Evaluation of patients with cerebral palsy using speed-matched controls alters and may improve selection of patients for hamstrings lengthening procedures. Copyright © 2010 Elsevier Ltd. All rights reserved.

PMID: 20381047 [PubMed - as supplied by publisher]

### 4. Psychiatry Res. 2010 Apr 7. [Epub ahead of print]

#### rTMS for adolescents: Safety and efficacy considerations.

D'Agati D, Bloch Y, Levkovitz Y, Reti I.

Department of Psychiatry and Behavioral Sciences, The School of Medicine, Johns Hopkins University, 600 N. Wolfe St. Baltimore, MD 21287, United States.

In light of both the FDA's clearance of repetitive transcranial magnetic stimulation (rTMS) for adult major depressive

disorder and concerns about safety and efficacy of existing antidepressant therapies for adolescent depression, there is increasing interest in rTMS as a novel treatment for adolescent depression. We reviewed English-language studies using rTMS in persons under the age of 18, yielding 6 published reports. Because rTMS is typically delivered at or above 1Hz for psychiatric indications, our search was confined to these frequencies. Also included are studies involving rTMS above 1Hz for non-psychiatric indications. Articles were retrieved from the MEDLINE database. There were 19 reported subjects under age 18 who have been administered rTMS at a frequency above 1Hz: 10 for major depression, 5 for spastic cerebral palsy and 4 for epilepsy partialis continua. We found that most subjects responded favorably to rTMS and no adverse events have been reported. However data are insufficient for drawing firm conclusions about safety and efficacy. Further studies of rTMS as a treatment for adolescent depression are warranted. Copyright © 2010 Elsevier Ireland Ltd. All rights reserved.

PMID: 20381158 [PubMed - as supplied by publisher]

## **5. Arch Phys Med Rehabil. 2010 Apr;91(4):653-5.**

### **Compartment syndrome after serial casting in spastic diplegic cerebral palsy: a case report.**

Muchow RD, Flannery WD, Miedaner JA, Noonan KJ, McCarthy JJ.

Department of Orthopedic Surgery and Rehabilitation, University of Wisconsin, Madison, WI 53792, USA.  
rmuchow@uwhealth.org

We present the case of a 24-year-old woman with spastic diplegic cerebral palsy who developed left lower extremity compartment syndrome after serial casting to treat an equinus contracture. To our knowledge, this represents the first case of compartment syndrome that has occurred from cast application to treat a deformity. The cast was the second placed in the treatment series and was removed 18 hours later because of increased pain. The clinical picture progressed despite the cast being removed. Accordingly, the patient presented to the emergency department with uncontrollable pain and a peroneal nerve deficit. Compartment pressures were measured in the anterior, lateral, superficial, and deep posterior compartments and were 80, 56, 31, and 90 mmHg, respectively. She required 4-compartment fasciotomy, eventual skin grafting of her lateral wound, and late gastrocnemius lengthening for recurrent equinus contracture. The purpose of this report is to alert clinicians to the potential for compartment syndrome to occur as a result of serial casting applied to correct deformity. Copyright 2010 American Congress of Rehabilitation Medicine. Published by Elsevier Inc. All rights reserved.

PMID: 20382301 [PubMed - in process]

## **6. Arch Phys Med Rehabil. 2010 Apr;91(4):615-23.**

### **Evaluation of the catch in spasticity assessment in children with cerebral palsy.**

van den Noort JC, Scholtes VA, Becher JG, Harlaar J.

Department of Rehabilitation Medicine, Research Institute MOVE, Vrije Universiteit University Medical Center, 1007 MB Amsterdam, The Netherlands. j.vandennoort@vumc.nl

**OBJECTIVE:** To evaluate whether the catch in clinical spasticity assessment in cerebral palsy (CP) is the consequence of a sudden velocity-dependent increase in muscle activity, resulting from hyperexcitability of the stretch reflex in spasticity. **DESIGN:** Cross-sectional study. **SETTING:** A special school for children with physical disabilities. **PARTICIPANTS:** Children with CP (N=20; age range, 5-14y; mean weight +/- SD, 35+/-14kg; mean length +/- SD, 139+/-19cm). **INTERVENTIONS:** Spasticity assessment tests (using slow and fast passive stretch) were performed in the medial hamstrings, soleus, and medial gastrocnemius muscles of the children by 2 experienced examiners. **MAIN OUTCOME MEASURES:** Surface electromyography (EMG) was recorded and joint motion was simultaneously measured using 2 inertial sensors. The encounter of a catch by the examiner was compared with the presence of a sudden increase in muscle activity ("burst"). The average rectified value (ARV) of the EMG signal was calculated for each test. **RESULTS:** The study shows a sudden increase in muscle activity in fast passive stretch, followed by a catch (hamstrings 100%, soleus 95%, gastrocnemius 84%). The ARV in slow passive stretch was significantly lower. **CONCLUSIONS:** The results confirm that in children with CP, an increase in muscle activity is primarily responsible for a catch in fast passive muscle stretch. Copyright 2010 American Congress of Rehabilitation

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PMID: 20382296 [PubMed - in process]

### 7. *Ann Otol Rhinol Laryngol.* 2010 Mar;119(3):141-9.

#### **Paced glottic closure for controlling aspiration pneumonia in patients with neurologic deficits of various causes.**

Broniatowski M, Moore NZ, Grundfest-Broniatowski S, Tucker HM, Lancaster E, Krival K, Hadley AJ, Tyler DJ.

Department of Otolaryngology-Head and Neck Surgery, Case Western Reserve University School of Medicine, Ohio, USA.

**OBJECTIVES:** We undertook to determine whether paced vocal fold adduction can check aspiration in patients with various neurologic conditions. **METHODS:** Five patients with fluoroscopically documented aspiration and repeated pneumonias were enrolled. Two previously reported patients with hemispheric stroke were compared to 3 additional subjects with brain stem-basal ganglia and cerebellar stroke, cerebral palsy, and multiple sclerosis. A modified Vocale stimulator was implanted subcutaneously and linked to the ipsilateral recurrent laryngeal nerve via perineural electrodes. Vocal fold adduction and glottic closure were effected with pulse trains (42 Hz; 1.2 mA; 188 to 560 micros) and recorded with Enhanced Image J. Fluoroscopy results with and without stimulation were assessed by 2 independent blinded reviewers. Pneumonia rates were compared before, during, and after the 6- to 12-month enrollment periods. **RESULTS:** There was statistically significant vocal fold adduction ( $p < 0.05$ ) for all patients, further verified with bolus arrest ( $p < 0.05$  for thin liquids, thick liquids, and puree depending on the speech-language pathologist). Pneumonia was prevented in 4 of the 5 patients during enrollment. In the fifth patient, who had brain stem-basal ganglia and cerebellar stroke, we were unable to completely seal the glottis and open the cricopharyngeus enough to handle his secretions. **CONCLUSIONS:** Vocal fold pacing for aspiration pneumonia from a variety of neurologic insults appears to be appropriate as long as the glottis can be sealed. It is not sufficient when the cricopharyngeus must be independently opened.

PMID: 20392026 [PubMed - in process]

### 8. *Zhongguo Zhen Jiu.* 2010 Feb;30(2):89-92.

#### **Clinical evaluation on balanced muscular tension needling method for improving disabled function of stroke patients with spastic paralysis [Article in Chinese]**

Lou BD, Zhang W, Liu Z, Lan H, Li JR, Wang JJ.

Department of Acup-Mox and Rehabilitation, The First Affiliated Hospital of Hunan University of TCM, Changsha 410007, China. loubidan3316@hotmail.com

**OBJECTIVE:** To observe the effect of balanced muscular tension needling method for improving disabled function of stroke patients with spastic paralysis. **METHODS:** One hundred and six cases with spastic paralysis were randomly divided into an observation group (54 cases) with balanced muscular tension needling method and a control group (52 cases) with routine acupuncture method. The observation group was treated by acupuncture at the side of extensor and flexor of limbs; while the control group was treated by acupuncture at Jianyu (LI 15), Quchi (LI 11), Waiguan (TE 5) etc. And the change of muscle strength, muscle tonus, muscle spasticity and range of joint motion were evaluated before and after treatment. **RESULTS:** After 30 days of treatment, the total effective rate of 96.3% (52/54) in the observation group was superior to that of 84.6% (44/52) in the control group ( $P < 0.01$ ). After treatment muscle strength, muscle tonus, muscle spasticity and range of joint motion were improved in the two groups, but the observation group was superior to the control group (all  $P < 0.05$ ). **CONCLUSION:** Balanced muscular tension needling method can significantly improve the muscle strength, muscle tonus, muscle spasticity and the range of joint motion of the stroke patients with spastic paralysis.

PMID: 20214061 [PubMed - indexed for MEDLINE]

## Epidemiology / Aetiology / Diagnosis & Early Treatment

*Please note: This is not yet a comprehensive outline of cerebral palsy prevention literature. It is expected that more research will be included when the search terms are expanded to include key terms other than "cerebral palsy". It is a work-in-progress and it will be expanded in coming months.*

### 9. Neuroradiology. 2010 Apr 15. [Epub ahead of print]

#### **Intracranial hemorrhage in full-term newborns: a hospital-based cohort study.**

Brouwer AJ, Groenendaal F, Koopman C, Nieuvelstein RJ, Han SK, de Vries LS.

Department of Neonatology, Wilhelmina Children's Hospital, University Medical Center Utrecht, PO Box 85090, 3508 AB, Utrecht, The Netherlands.

**INTRODUCTION:** In recent years, intracranial hemorrhage (ICH) with parenchymal involvement has been diagnosed more often in full-term neonates due to improved neuroimaging techniques. The aim of this study is to describe clinical and neuroimaging data in the neonatal period and relate imaging findings to outcome in a hospital-based population admitted to a level 3 neonatal intensive care unit (NICU). **METHODS:** From our neuroimaging database, we retrospectively retrieved records and images of 53 term infants (1991-2008) in whom an imaging diagnosis of ICH with parenchymal involvement was made. Clinical data, including mode of delivery, clinical manifestations, neurological symptoms, extent and site of hemorrhage, neurosurgical intervention, and neurodevelopmental outcomes, were recorded. **RESULTS:** Seventeen of the 53 term infants had infratentorial ICH, 20 had supratentorial ICH, and 16 had a combination of the two. Seizures were the most common presenting symptom (71.7%), another ten infants (18.9%) presented with apneic seizures, and five infants had no clinical signs but were admitted to our NICU because of perinatal asphyxia ( $n = 2$ ), respiratory distress ( $n = 2$ ), and development of posthemorrhagic ventricular dilatation ( $n = 1$ ). Continuous amplitude-integrated electroencephalography recordings were performed in all infants. Clinical or subclinical seizures were seen in 48/53 (90.6%) infants; all received anti-epileptic drugs. Thirteen of all 53 (24.5%) infants died. The lowest mortality rate was seen in infants with supratentorial ICH (10%). Three infants with a midline shift required craniotomy, six infants needed a subcutaneous reservoir due to outflow obstruction, and three subsequently required a ventriculoperitoneal shunt. The group with poor outcome (death or developmental quotient (DQ)  $<85$ ) had a significantly lower 5-min Apgar score ( $p = .006$ ). Follow-up data were available for 37/40 survivors aged at least 15 months. Patients were assessed with the Griffiths Mental Developmental Scales, and the mean DQ of all survivors was 97 (SD = 12). Six infants (17%) had a DQ below 85 [two of them had cerebral palsy (CP)]. Three infants developed CP (8.6%); one had cerebellar ataxia, and two had hemiplegia. **CONCLUSION:** ICH with parenchymal involvement carries a risk of adverse neurological sequelae with a mortality of 24.5% and development of CP in 8.6%. The high mortality rate could partly be explained by associated perinatal asphyxia. Infants with supratentorial ICH had a lower, although not significant, mortality rate compared with infants with infratentorial ICH and infants with a combination of supratentorial ICH and infratentorial ICH. In spite of often large intraparenchymal lesions, 30 of the 34 survivors without CP (88.2%) had normal neurodevelopmental outcome at 15 months.

PMID: 20393697 [PubMed - as supplied by publisher]

### 10. Neonatology. 2010 Apr 13;98(3):217-224. [Epub ahead of print]

#### **Dexamethasone Treatment in the First Week of Life for Preventing Bronchopulmonary Dysplasia in Preterm Infants: A Systematic Review.**

Doyle LW, Ehrenkranz RA, Halliday HL.

Department of Obstetrics and Gynaecology, and Paediatrics, University of Melbourne, The Royal Women's Hospital, and Murdoch Children's Research Institute, Melbourne, Vic., Australia.

**Background:** Dexamethasone treatment started soon after birth is controversial. **Objectives:** To determine if postnatal dexamethasone treatment during the first week of life is beneficial in preventing bronchopulmonary dysplasia (BPD) in preterm infants. **Methods:** Randomised controlled trials of postnatal dexamethasone therapy started in the

first week of life in infants at risk of BPD were sought using methods of the Cochrane Collaboration. Data regarding clinical outcomes including mortality, BPD, death or BPD, complications during the primary hospitalisation, and long-term outcome were identified and analysed using RevMan 5. Results: 20 randomised controlled trials enrolling a total of 2,860 participants were eligible for inclusion. Meta-analysis of these trials demonstrated significant benefits as regards earlier extubation and decreased risks of BPD at both 28 days' and 36 weeks' postmenstrual age (PMA), death or BPD at 28 days' and 36 weeks' PMA, patent ductus arteriosus and severe retinopathy of prematurity. Gastrointestinal bleeding and intestinal perforation were important adverse effects, and the risks of hyperglycaemia and hypertension were also increased. In the seven trials (921 infants) that reported late outcomes, cerebral palsy and the combined outcome of death or cerebral palsy were significantly more common in those treated with dexamethasone. Conclusions: The benefits of early dexamethasone treatment ( $\leq 7$  days) to prevent BPD do not outweigh the known or potential adverse effects of this treatment, and it cannot be recommended for routine clinical practice. Copyright © 2010 S. Karger AG, Basel.

PMID: 20389126 [PubMed - as supplied by publisher]

#### 11. J Pediatr. 2010 Apr 8. [Epub ahead of print]

##### **Serial MRI and Neurodevelopmental Outcome in 9- to 10-Year-Old Children with Neonatal Encephalopathy.**

van Kooij BJ, van Handel M, Nievelstein RA, Groenendaal F, Jongmans MJ, de Vries LS.

Department of Neonatology, University Medical Center, The Netherlands.

**OBJECTIVE:** To assess the relation between patterns of brain injury on neonatal and childhood magnetic resonance imaging (MRI) and long-term neurodevelopmental outcome. **STUDY DESIGN:** Neonatal ( $n = 34$ ) and childhood MRIs ( $n = 77$ ) were analyzed for 80 children with neonatal encephalopathy and for 51 control subjects during childhood. MRIs were graded as normal, mildly abnormal (white matter lesions), or moderately/severely abnormal (watershed injury, lesions in basal ganglia/thalamus or focal infarction). Severity of brain injury was related to different aspects of neurologic outcome: Total impairment score of the Movement Assessment Battery for Children, intelligence quotient score, cerebral palsy, postneonatal epilepsy, and need for special education. Seven children with neonatal encephalopathy required extracorporeal membrane oxygenation treatment. **RESULTS:** Neonatal and childhood MRI were comparable in 25/33 children (75.8%,  $P < .001$ ). Children with moderate/severe lesions on neonatal or childhood MRI more often had a total impairment score  $\leq 15$ th percentile, an intelligence quotient  $\leq 85$ , and cerebral palsy, and attended special education. **CONCLUSION:** Different patterns of injury seen on neonatal MRI after neonatal encephalopathy can still be recognized on childhood MRI. Children with moderate to severe brain lesions on neonatal or childhood MRI significantly more often have impaired motor and cognitive outcomes. Copyright © 2010 Mosby, Inc. All rights reserved.

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#### 12. Neurosci Lett. 2010 Jan 22;469(2):243-7. Epub 2009 Dec 5.

##### **Partial recovery of hemiparesis following hemispherectomy in infant monkeys.**

Burke MW, Zangenehpour S, Ptito M.

School of Optometry, University of Montreal, Montreal, QC, Canada. mark.burke@umontreal.ca

Hemiparesis, unilateral weakness or partial paralysis, is a common outcome following hemispherectomy in humans. We use the non-human primate as an invaluable translational model for our understanding of developmental plasticity in response to hemispherectomy. Three infant vervet monkeys (*Chlorocebus sabeus*) underwent hemispherectomy at a median age of 9 weeks and two additional monkeys at 48 months. Gross motor assessment was conducted in a large open field that contained a horizontal bar spanning the width of the cage. Subjects were assessed yearly following surgery in infantile lesions for a period of 3 years. Adult-lesioned subjects were assessed 40 months following surgery. Shortly after surgery both infant and adult-lesioned subjects were unable to move the contralateral side of their body, but all subjects were able to walk within 6 months following surgery. At each time point the lower limb gait was normal in infant-lesioned subjects with no apparent limp or dragging, however the upper limb demonstrated significant impairment. Horizontal bar crossing was significantly impaired during the first 24

months following surgery. Adult-lesioned subjects also displayed upper limb movement impairments similar to infant-lesioned subjects. In addition the adult-lesioned subjects displayed a noticeable lower limb limp, which was not observed in the infant-lesioned group. Both groups at each time point showed a propensity for ipsiversive turning. The upper limb gait impairment and horizontal bar crossing of lesioned subjects are reminiscent of hemiparesis seen in hemispherectomized humans with the young-lesioned subjects showing a greater propensity for recovery. (c) 2009 Elsevier Ireland Ltd. All rights reserved.

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