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Interventions and Management

1. Disabil Rehabil. 2011;33(21-22):2084-91. Epub 2011 Mar 30.

Development of handwriting skill in children with unilateral cerebral palsy (CP).

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Aim. To investigate the development of handwriting, fine motor skills and school marks in children with unilateral cerebral palsy (CP) and relate the performance in handwriting skill to age and IQ at a 16-month follow-up. **Method.** Data from 16 children (5 females, 11 males; mean age 11 years 4 months, SD 1 year 6 months, range 8-13 years) with left-sided hemiplegia were collected. The Minnesota Handwriting Assessment (MHA) for handwriting skill, the Bruininks-Oseretsky Test of Motor Proficiency (BOTMP) for fine motor skills, the Wechsler Intelligence Scale for Children Revised (WISC-R) for IQ, the Manual Ability Classification System (MACS) and school marks of children were used. **Results.** Handwriting quality, handwriting speed and fine motor skills improved over 16 months but the children with unilateral CP still performed below their peers. School marks did not change. The regression model (Adj. R(2) = 0.76) revealed that age and IQ were negatively correlated and good predictors for the improvement in handwriting quality. No relationship was found between handwriting speed and age or IQ. **Conclusion.** Children with unilateral CP continued to develop handwriting skill over a longer time period than expected. Age and IQ predicted the rate of development in handwriting quality. Children kept up school marks despite the increasing demands of the succeeding grade.

[PMID: 21446885](https://pubmed.ncbi.nlm.nih.gov/21446885/) [PubMed - in process]

2. IEEE Trans Neural Syst Rehabil Eng. 2011 Oct 6. [Epub ahead of print]

Lack of Predictive Control in lifting series of virtual objects by individuals with diplegic Cerebral Palsy.

Mawase F, Barhaim S, Karniel A.

To date, research on the motor control of hand function in cerebral palsy has focused on children with hemiplegia, although many people with diplegic cerebral palsy (dCP) have asymmetrically decreased hand function. We explored the predictive capabilities of the motor system in a simple motor task of lifting a series of virtual objects for five people with spastic dCP and five age-matched controls. When a person lifts an object, s/he uses an expectation of the weight of the object to generate a motor command. We asked the study subjects to lift a series

of increasing weights and determined whether they extrapolated from past experience to predict the next weight in the series, even though that weight had never been experienced. Planning of precision grasp was assessed by measurement of the grip force at the beginning of the lifting task and by estimating the motor command. Execution of precision grasp was assessed by measurement of the time interval between the onset of grip and the onset of movement. We found that persons with dCP demonstrated a lack of predictive feed-forward control in their lifting movements: they exhibited a significantly longer time between onset of grip and onset of movement than the control subjects and they did not predict the weight of the next object in the lifting task. In addition, for dCP subjects the time between the onset of grip and the onset of movement of the dominant hand correlated strongly with the outcome of a hand function test. We postulate that a higher-order motor planning deficit in addition to execution deficit are evident in the subjects with spastic diplegic.

[PMID: 21984525](#) [PubMed - as supplied by publisher]

3. J Electromyogr Kinesiol. 2011 Oct 7. [Epub ahead of print]

Anticipatory postural adjustments in children with hemiplegia and diplegia.

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Anticipatory postural adjustments (APAs) play an important role in the performance of many activities requiring the maintenance of standing posture. However, little is known about if and how children with cerebral palsy (CP) generate APAs. Two groups of children with CP (hemiplegia and diplegia) and a group of children with typical motor development performed arm flexion and extension movements while standing on a force platform. Electromyographic activity of six trunk and leg muscles and displacement of center of pressure (COP) were recorded. Children with CP were able to generate anticipatory postural adjustments and produce directionally specific APAs and COP displacements similar to those described in adults and typically developing children. However, children with diplegia were unable to generate APAs of the same magnitude as children with typical development and hemiplegia and had higher baseline muscle activity prior to movement. In children with diplegia, COP was posteriorly displaced and peak acceleration was smaller during bilateral extension compared to children with hemiplegia. The outcomes of the study highlight the role of APAs in the control of posture of children with CP and point out the similarities and differences in anticipatory control in children with diplegia and hemiplegia. These differences may foster ideas for treatment strategies to enhance APAs in children with CP.

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4. Res Dev Disabil. 2011 Nov;32(6):2075-83. Epub 2011 Sep 15.

Perception-action and adaptation in postural control of children and adolescents with cerebral palsy.

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The aim of this study was to examine the coupling between visual information and body sway and the adaptation in this coupling of individuals with cerebral palsy (CP). Fifteen children with and 15 without CP, 6-15 years old, were required to stand upright inside of a moving room. All children first performed two trials with no movement of the room and eyes open or closed, then four trials in which the room oscillated at 0.2 or 0.5Hz (peak velocity of 0.6cm/s), one trial in which the room oscillated at 0.2Hz (peak velocity of 3.5cm/s), and finally two other trials in which the room oscillated again at 0.2Hz (peak velocity of 0.6cm/s). Participants with CP coupled body sway to visual information provided by the moving room, comparable to the coupling of participants without CP. However, participants with CP exhibited larger body sway in maintaining upright position and more variable sway when body sway was induced by visual manipulation. They showed adaptive sensory motor coupling, e.g. down-weighting

visual influence when a larger stimulus was provided, but not with the same magnitude as typically developing participants. This indicates that participants with CP have less capability of adaptation.

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5. J Fam Health Care. 2011 Jul-Aug;21(4):29-31.

Dyspraxia series: part one. At sixes and sevens.

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Developmental Co-ordination Disorder (DCD), also known as Dyspraxia in the UK, is a common disorder affecting motor co-ordination in children and for many continues into adulthood. This condition is formally recognised by international organisations including the World Health Organisation. DCD is distinct from other motor disorders such as cerebral palsy and stroke. The range of intellectual ability is in line with the general population. Individuals may vary in how their difficulties present. The co-ordination difficulties may affect participation and functioning of everyday life skills in education, work and employment. Children may present with difficulties in writing, typing, riding a bike, self care tasks, and recreational activities. In adulthood many of these difficulties will continue, as well as learning new skills at home and work such as planning, organisation, driving a car and DIY.

[PMID: 21980693](#) [PubMed - in process]

6. J Altern Complement Med. 2011 Oct 12. [Epub ahead of print]

Structural Integration, an Alternative Method of Manual Therapy and Sensorimotor Education.

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Objectives: The objectives of this report are to review the clinical practice of Structural Integration (SI), an alternative method of soft-tissue manipulation and sensorimotor education, and to summarize the evidence to date for mechanism and clinical efficacy. **Methods:** The author's personal knowledge of SI literature, theory, and practice was supplemented by a database search, consultation with other senior SI practitioners, and examination of published bibliographies and websites that archive SI literature. **Results:** SI purports to improve biomechanical functioning as a whole by progressively approximating specific ideals of posture and movement, rather than to treat particular symptoms. Hypothesized mechanisms at the level of local tissue change include increases in soft-tissue pliability, release of adhesions between adjacent soft-tissue structures, and increased interstitial fluid flow with consequently improved clearance of nociceptive potentiators. Hypothesized mechanisms for more global changes include improved biomechanical organization leading to reductions in mechanical stress and nociceptive irritation, a perception of improved biomechanical efficiency and coordination that generalizes to the self, and improvements in sensory processing and vagal tone. Emotional catharsis is also thought to contribute to psychologic changes. Limited preliminary evidence exists for improvements in neuromotor coordination, sensory processing, self-concept and vagal tone, and for reductions in state anxiety. Preliminary, small sample clinical studies with cerebral palsy, chronic musculoskeletal pain, impaired balance, and chronic fatigue syndrome have reported improvements in gait, pain and range-of-motion, impaired balance, functional status, and well-being. Adverse events are thought to be mild and transient, although survey data are not available. Contraindications are thought to be the same as for massage. **Conclusions:** Evidence for clinical effectiveness and hypothesized mechanisms is severely limited by small sample sizes and absence of control arms. In view of the rapidly increasing availability of SI and its use for treatment of musculoskeletal pain and dysfunction, more adequate research is warranted.

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7. Clin Orthop Relat Res. 2011 Oct 8. [Epub ahead of print]**Multilevel Surgery Improves Gait in Spastic Hemiplegia But Does Not Resolve Hip Dysplasia.**

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BACKGROUND: Multilevel orthopaedic surgery may improve gait in Type IV hemiplegia, but it is not known if proximal femoral osteotomy combined with adductor release as part of multilevel surgery in patients with hip dysplasia improves hip development. **QUESTIONS/PURPOSES:** We asked whether varus derotational osteotomy of the proximal femur, combined with adductor release, influenced hip development in patients with Type IV hemiplegia having multilevel surgery. **PATIENTS AND METHODS:** We retrospectively reviewed 11 children and adolescents with Type IV hemiplegia who had a proximal femoral osteotomy due to unilateral hip displacement to correct gait dysfunction between 1999 and 2006. The mean age at the time of surgery was 11.1 years (range, 7 to 16 years). We obtained the Movement Analysis Profile and Gait Profile Score before and after surgery. We also measured the Migration Percentage of Reimers and applied the Melbourne Cerebral Palsy Hip Classification System (MCPHCS). The minimum followup was 2 years 3 months (mean, 6 years 6 months; range, 2 years 3 months to 10 years 8 months). **RESULTS:** The majority of gait parameters improved but hip development was not normalized. According to the MCPHCS at last followup, no hips were classified as Grade I, two hips were classified as Grade II, and the remainder were Grade III and IV. **CONCLUSIONS:** Unilateral surgery including a proximal femoral osteotomy improved gait and walking ability in individuals with spastic hemiplegic cerebral palsy. However, hip dysplasia persists.

LEVEL OF EVIDENCE: Level IV, therapeutic study. See Guidelines for Authors for a complete description of levels of evidence.

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8. Ortop Traumatol Rehabil. 2011 Mar-Apr;13(2):185-9.**Effectiveness of two methods of treatment of the spastic hip in CP children [Article in English, Polish]**

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BACKGROUND: Authors analysed the post-operative course of the hip joints in ICP children following two types of surgery. **MATERIAL AND METHODS:** We analysed 50 children with CP (100 hips) treated in our department between 1999-2004 whose radiological records were complete. The children were divided into 2 groups of those following open adductor tenotomy and those treated according to Gob's method, i.e. by release of the flexion-adduction hip contracture. Hip joint stability was compared radiologically with the Reimers index. Consecutive radiographs were obtained at least 6 months apart and at least two radiographs were obtained in each patient. **RESULTS:** In the first group, the Reimers index improved in 56 hips (70%), deteriorated in 14 hips (17.5%), and did not change in 10 hips (12.5%). In the second group, the index improved in 6 hips (30%), deteriorated in 4 hips (20%), and did not change in 10 hips (50%). **CONCLUSIONS:** 1. Open adductor tenotomy may be an effective treatment for hip joint instability in cerebrally palsied children. 2. Continual monitoring of the Reimers index is a prerequisite for predicting the natural history of the spastic hip.

[PMID: 21602585](#) [PubMed - indexed for MEDLINE]

9. Ortop Traumatol Rehabil. 2011 Mar-Apr;13(2):163-72.**Unilateral and bilateral neurogenic dislocation of the hip joint--which deformity is more difficult to treat? [Article in English, Polish]**

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BACKGROUND: Authors present and compare the results of treatment of spastic hip dislocation in a group of patients with unilateral or bilateral dislocation. **MATERIAL AND METHODS:** We analyzed a group of 77 patients (109 hips) with a dislocated hip joint (MP>80%). The patients were divided into Group 1 (47 hip joints, 47 patients) with unilateral dislocation and Group 2 (62 hips, 31 patients) with bilateral dislocation. The mean duration of follow-up was 2.5 years (range 1.2-7.5) in Group 1 and 3.4 years (1.2-10.2) in Group 2. The hips were evaluated clinically and radiographically in the pre- and post-operative period. The relation of the femoral head to the acetabulum was described as the Acetabular Index (AI) and Reimers' migration percentage (MP). The Pelvic Femoral Angle (PFA) was used to measure the degree of windblown deformity. **RESULTS:** There were three cases of post-operative redislocation (MP>80%) and four cases of severe subluxation (MP>50%) in Group 1 compared to no dislocations in Group 2. In Group 1, AI improved from 31.3° (20°-50°) to 22.7° (3°-50°) and MP improved from 98.8% (85%-100%) to 23.4% (0%-100%). In Group 2, AI improved from 30.5° (10°-62°) to 19.9° (4°-40°) and MP improved from 98.8% (82%-100%) to 9.6% (0%-60%). In Group 1, PFA before surgery was -10.3° (-40° to 10°) for the dislocated side and 6.6° (-16° to 55°) for the non-dislocated side and after surgery it was -5.7° (-46 to 45) for the treated side and 5.6° (-18° to 45°) for the untreated side. In Group 2, PFA was -3.1° (-22° to 9°) before surgery and -0.15° (-18° to 25°) after surgery. We found improved ranges of motion for the movements investigated.

CONCLUSION: The clinical and radiological results of operative treatment presented in this paper allow for the conclusion that patients with unilateral dislocations run a higher risk of redislocation, subluxation, and windblown deformity.

[PMID: 21602583](#) [PubMed - indexed for MEDLINE]**10. Res Dev Disabil. 2011 Nov;32(6):2108-13. Epub 2011 Sep 15.****Communication deficits in infants and toddlers with developmental disabilities.**

Hattier MA, Matson JL, Sipes M, Turygin N.

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Research that focuses on detecting and assessing the presence of communication impairments in children with developmental disabilities exists. However, more research is needed which compares these deficits across individuals with various developmental disabilities. This information could inform the assessment process and treatment programs. Therefore, the purpose of the current study was to examine communication deficits in toddlers who were diagnosed with Down syndrome, Cerebral Palsy (CP), had a history of seizures or a seizure disorder, and who were born premature. A total of 140 toddlers 17-35 months of age met inclusion criteria for the study. Those diagnosed with CP evinced significantly fewer communication impairments on the Baby and Infant Screen for aUtism Traits-Part 1 (BISCUIT-Part 1) than children with Down syndrome and children with a history of seizures or seizure disorder. No significant differences were found on the communication subscale for the comparison of those with CP and those born prematurely. Children diagnosed with CP had fewer endorsements, indicating less impairment, on all six items of the Communication subscale of the BISCUIT-Part 1 when compared to the three other diagnostic groups. Implications of these results are discussed for children with differing handicaps.

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11. ISRN Dent. 2011;2011:146915. Epub 2010 Dec 1.**Bruxism control in a child with cerebral palsy.**

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Cerebral palsy (CP) is one of the most severe childhood disabilities due to a lesion in the developing brain. Oral conditions often observed in this pathogenic are a tendency for the delayed eruption of permanent molars, higher percentages of malocclusion and parafunctional habits, including bruxism. The significance of oral conditions observed in CP patients demonstrates the need for intensive home and professional care for these individuals. This paper presents a 7-year-old boy, with cerebral palsy, severe mental retardation, who had high abrasion wear of the primary teeth related to bruxism. Dental care was carried out under oxide-induced sedation, and management of the bruxism was achieved after the use of a resin acrylic protective appliance fixed on both sides of the mandibula. The treatment performed offered efficiency advantages, was clinically viable, and should be a valuable option to practitioners considering appliance therapy to control parafunctional behavior.

[PMID: 21991456](#) [PubMed - in process] PMID: PMC3170074

12. Arerugi. 2011 Jul;60(7):823-33.**Prevalence of allergy in patients with severe motor and intellectual disabilities (SMID) [Article in Japanese]**

Hosoki K, Suga S, Takahashi J, Tanida H, Nagao M, Fujisawa T.

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BACKGROUND: Recent advances in medical care have drastically improved life prognosis of severe life-threatening diseases in newborns and young children. However, 'intact' survival without sequelae for all the children is still to be achieved and prevalence of severe motor and intellectual disabilities (SMID) secondary to central nervous system damages of any cause in childhood, especially in neonatal period, is increasing. Patients with SMID have complex problems involving multiple organs and multidisciplinary approach is mandatory. However, prevalence of allergic diseases in SMID patients is not known. **METHODS:** Forty one patients who were institutionalized and 26 outpatients at Mie National Hospital with SMID were enrolled. Diagnosis of allergic diseases was determined based on guidelines for the institutionalized patients and on a questionnaire asking if he/she had ever been diagnosed as the allergic diseases by any physician for outpatients. Serum total IgE, specific IgE to common allergens, eosinophil number, and exhaled nitric oxide by on-line tidal breathing method were measured. **RESULTS:** Lifetime prevalence of bronchial asthma, atopic dermatitis, food allergy, allergic rhinitis, allergic conjunctivitis, and drug allergy were 13.4%, 3.0%, 3.0%, 23.9%, 10.4%, and 6.0%, respectively. The sensitizations to Japanese cedar pollen, cypress, orchard grass, and ragweed were significantly more prevalent in outpatients compared with institutionalized patients. The prevalence of allergic rhinitis and allergic conjunctivitis are higher in outpatients compared with institutionalized patients (61.5% vs 0%, 23.1% vs 2.4%, respectively, $p < 0.05$). Exhaled nitric oxide levels in subjects who were diagnosed as asthma were significantly higher than in non-asthma. **CONCLUSIONS:** Allergic diseases are as common in SMID patients as general population. Further study is necessary to establish proper management for the patients.

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Prevention and Cure

13. *Exp Neurol.* 2011 Oct 1. [Epub ahead of print]

Polymer and nano-technology applications for repair and reconstruction of the central nervous system.

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The hydrophilic polymer PEG and its related derivatives, have served as therapeutic agents to reconstruct the phospholipid bilayers of damaged cell membranes by erasing defects in the plasmalemma. The special attributes of hydrophilic polymers when in contact with cell membranes have been used for several decades since these well-known properties have been exploited in the manufacture of monoclonal antibodies. However, while traditional therapeutic efforts to combat traumatic injuries of the central nervous system (CNS) have not been successful, nanotechnology-based drug delivery has become a new emerging strategy with the additional promise of targeted membrane repair. As such, this potential use of nanotechnology provides new avenues for nanomedicine that uses nanoparticles themselves as the therapeutic agent in addition to their other functionalities. Here we will specifically address new advances in experimental treatment of Spinal Cord and Traumatic Brain injury (SCI and TBI respectively). We focus on the concept of repair of the neurolemma and axolemma in the acute stage of injury, with less emphasis on the worthwhile, and voluminous, issues concerning regenerative medicine/nanomedicine. It is not that the two are mutually exclusive - they are not. However, the survival of the neuron and the tissues of white matter are critical to any further success in what will likely be a multi-component therapy for TBI and SCI. This review includes a brief explanation of the characteristics of traumatic spinal cord injury SCI, the biological basis of the injuries, and the treatment opportunities of current polymer-based therapies. In particular, we update our own progress in such applications for CNS injuries with various suggestions and discussion, primarily nanocarrier-based drug delivery systems. The application of nanoparticles as drug-delivery vehicles to the CNS may likely be advantageous over existing molecular-based therapies. As a "proof-of-concept", we will discuss the recent investigations that have preferentially facilitated repair and functional recovery from breaches in neural membranes via rapid sealing and reassembly of the compromised site with silica or chitosan nanoparticles.

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