

Monday 3 August 2015

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## Interventions and Management

### 1. Rev Bras Ortop. 2014 Dec 30;50(1):68-71.

#### **Bone mineral density evaluation among patients with neuromuscular scoliosis secondary to cerebral palsy.**

Rezende R, Cardoso IM, Leonel RB, Perim LG, Oliveira TG, Jacob Júnior C, Júnior JL, Lourenço RB.

**OBJECTIVE:** To evaluate bone mineral density among patients with neuromuscular scoliosis secondary to quadriplegic cerebral palsy. **METHODS:** This was a descriptive prospective study in which both bone densitometric and anthropometric data were evaluated. The inclusion criteria used were that the patients should present quadriplegic cerebral palsy, be confined to a wheelchair, be between 10 and 20 years of age and present neuromuscular scoliosis. **RESULTS:** We evaluated 31 patients (20 females) with a mean age of 14.2 years. Their mean biceps circumference, calf circumference and body mass index were 19.4 cm, 18.6 cm and 16.9 kg/m<sup>2</sup>, respectively. The mean standard deviation from bone densitometry was -3.2 (z-score), which characterizes osteoporosis. **CONCLUSION:** There is high incidence of osteoporosis in patients with neuromuscular scoliosis secondary to quadriplegic cerebral palsy.

[PMID: 26229882](#)

### 2. J Pediatr Orthop. 2015 Jul 24. [Epub ahead of print]

#### **Percutaneous Subtrochanteric Osteotomy for Painful Dislocated Hips in Patients With Cerebral Palsy.**

Martinez M, Kim SJ, Sabharwal S.

**BACKGROUND:** Treatment of a painful, chronically dislocated hip in nonambulatory children with cerebral palsy (CP) is challenging and controversial. Although many surgical options have been described, there is limited information, including patient-centered outcomes, following treatment. The purpose of our study was to evaluate the effect of a percutaneous subtrochanteric valgus osteotomy (SVO) using external fixation (EF) on hip abduction, radiographic parameters, and quality of life (QOL) measures in such patients. **METHODS:** Fifteen nonambulatory patients (8 male, 7 female) with CP with 19 chronically dislocated hips underwent SVO using EF and adductor tenotomy at an average age of 14.3 years (range, 10.7 to 26.8 y). Changes in hip abduction and radiographic angular correction following surgery were assessed. Caregivers completed 2 surveys detailing differences in the patient's QOL measures, including severity and duration of pain and ease of nursing care, and the modified Child Health Index of Life with Disabilities (CPCHILD). **RESULTS:** Caregivers of 11 patients completed both surveys at an average follow-up of 50 months (range, 17 to 119 mo) after fixator removal. There was improvement in pain, sitting tolerance, ease of transfers, and perineal care in the majority (9/11) of patients. The modified CCHILD

(possible score, 10 to 50) improved from 27.2 to 16.23 ( $P=0.05$ ). Hip abduction improved from -7 degrees (range, -32 to 5 degrees) to 24 degrees (range, 0 to 40 degrees) ( $P<0.0001$ ). The average valgus osteotomy correction was 48.2 degrees (range, 2.2 to 93.2 degrees). The pelvic femoral shaft angle improved from -15.2 degrees (range, -47.7 to 7.4 degrees) to 15.4 degrees (-44.3 to 44.6 degrees). There was some correlation of both, change in hip abduction ( $R=0.55$ ) and osteotomy angle ( $R=0.60$ ), with improvement in QOL measures. There were 3 major complications (20%) in 15 patients. **CONCLUSIONS:** On the basis of preliminary results, percutaneous SVO stabilized with EF improves QOL in the majority of nonambulatory CP patients despite untoward events and is a viable alternative to open osteotomy with internal fixation. More robust comparative studies are needed to further assess the optimal salvage technique in this patient population. **LEVEL OF EVIDENCE:** Level IV.

[PMID: 26214329](#)

### **3. Rev Bras Ortop. 2015 Jun 16;50(3):254-259.**

#### **Hip salvage surgery in cerebral palsy cases: a systematic review.**

de Souza RC, Mansano MV, Bovo M, Yamada HH, Rancan DR, Fucs PM, Svartman C, de Assumpção RM.

Imbalance and muscle spasticity, in association with coxa valga and persistent femoral anteversion, compromises hip development in cases of cerebral palsy and may result in chronic pain and even dislocation. Some of these hips undergo salvage surgery because of the severe impact of their abnormalities in these patients' quality of life. We conducted a systematic review of the literature to compare the results from the main hip salvage techniques applied to these individuals. The literature search focused on studies that evaluated results from hip salvage surgery in cases of cerebral palsy, published from 1970 to 2011, which are present in the Embase, Medline, PubMed, Cochrane Library and SciELO databases. Although the results were not statistically comparable, this systematic review demonstrates that hip salvage surgery should be indicated after individual evaluation on each patient, due to the wide spectrum of presentations of cerebral palsy. Therefore, it seems that no surgical technique is superior to any other. Rather, there are different indications.

[PMID: 26229926](#)

### **4. Acta Paediatr. 2015 Jul 28. doi: 10.1111/apa.13141. [Epub ahead of print]**

#### **Children with cerebral palsy do not achieve healthy physical activity levels.**

Bratteby Tollerz LU, Forslund AH, Olsson RM, Lidström H, Holmbäck U.

**AIM:** This study compared daily activity energy expenditure (AEE) in children with cerebral palsy with a control group and investigated whether the children achieved healthy levels of physical activity. **METHODS:** We enrolled eight children with bilateral cerebral palsy, from eight to 10 years of age, and a group of controls matched for age and gender. For three days physical activity was simultaneously measured by accelerometers and self-reports using a diary. The daily AEE results were compared between groups and methods. The number of children that achieved healthy physical activity levels in each group was explored. **RESULTS:** Children with cerebral palsy had significantly lower daily AEE, as measured by accelerometers, than the controls and they did not achieve the healthy moderate to heavy physical activity level defined in the Nordic Nutrition Recommendations. Self-reports using the diaries resulted in an overestimation of physical activity compared with the ankle accelerometer measurements in both groups.

**CONCLUSION:** Our investigation of physical activity in children with cerebral palsy and controls using accelerometers and a diary, found low levels of daily AEE and physical activity and these results were most prominent in the group with cerebral palsy. The diaries overestimated physical activity in both groups. This article is protected by copyright. All rights reserved.

[PMID: 26215755](#)

### 5. Eur J Phys Rehabil Med. 2015 Jul 27. [Epub ahead of print]

#### An evaluator-blinded randomized controlled trial studying therapy effects and prognostic factors for a general and an individually defined physical therapy program in ambulant children with bilateral spastic cerebral palsy.

Franki I, Desloovere K, De Cat J, Tjihuis W, Molenaers G, Feys H, Vanderstraeten G, Van den Broeck C.

**BACKGROUND:** Cerebral Palsy (CP) is characterized by a heterogeneous nature with a variety of problems. Therefore, individualized physical therapy might be more appropriate to address the needs for these children.

**AIMS:**

The first aim was to compare the effectiveness of an individually-defined therapy program (IT) and a general therapy program (GT) on gait and gross motor function in children with CP. The second aim was to evaluate interaction-effects, time-effects, treatment with Botulinum Toxin A, age, gross motor function classification scale (GMFCS), treatment frequency and quality as factors influencing outcome. **DESIGN:** An evaluator-blinded, randomized controlled trial **SETTING:** Outpatient rehabilitation **POPULATION:** Forty ambulant children with spastic bilateral CP (mean age 6 years 1 month) **METHODS:** All children were randomly assigned to receive either IT or GT over a 10 week period. Nineteen of these children were enrolled into a second and/or third program, resulting in 60 interventions. Primary outcome was assessed with the Goal Attainment Scale (GAS) for gross motor function goals and z-scores for goals based on specific 3D gait parameters. Secondary outcome included the Gross Motor Function Measure-88 (GMFM-88) scores, time and distance gait parameters, Gait Profile Score, Movement Analysis Profiles and time needed to complete Timed-Up-and-Go and Five-Times-Sit-To-Stand tests. **RESULTS:** There were higher, but non-significant GAS and z-score changes following the IT program compared to the GT program (GAS: 46.2 for the IT versus 42.2 for the GT group,  $p=0.332$ , ES 0.15; z-score: 0.135 for the IT compared to 0.072 for the GT group,  $p=0.669$ , ES 0.05). Significant time-effects could be found on the GAS ( $p<0.001$ ) and the GMFM-88 total score ( $p<0.001$ ). Age was identified as a predictor for GAS and GMFM-88 improvement ( $p=0.023$  and  $p=0.044$ ). **CONCLUSION:** No significant differences could be registered between the effects of the IT and the GT. The favorable outcome after the IT program was only a trend and needs to be confirmed on larger groups and with programs of longer duration. **CLINICAL REHABILITATION IMPACT:** Both programs had a positive impact on the children's motor functioning. It is useful to involve older children more actively in the process of goal setting.

[PMID: 26220326](#)

### 6. Disabil Rehabil. 2015 Jul 28:1-5. [Epub ahead of print]

#### Physical activity predicts quality of life and happiness in children and adolescents with cerebral palsy.

Maher CA, Toohey M, Ferguson M.

**PURPOSE:** To examine the associations between physical activity, health-related quality of life and happiness in young people with cerebral palsy. **METHOD:** A total of 70 young people with cerebral palsy (45 males, 25 females; mean age 13 years 11 months, SD 2 years 0 month) took part in a cross-sectional, descriptive postal survey assessing physical activity (Physical Activity Questionnaire for Adolescents), functional ability (Gross Motor Function Classification System), quality of life (Pediatric Quality of Life Inventory 4.0) and happiness (single Likert-scale item). Relationships between physical activity, quality of life and happiness were examined using backward stepwise linear regression. **RESULTS:** Physical activity significantly predicted physical quality of life ( $R^2 = 0.64$ ,  $\beta = 6.12$ ,  $p = 0.02$ ), social quality of life ( $R^2 = 0.28$ ,  $\beta = 9.27$ ,  $p < 0.01$ ) and happiness ( $R^2 = 0.08$ ,  $\beta = 0.9$ ,  $p = 0.04$ ). Physical activity was not associated with emotional or school quality of life. **CONCLUSIONS:** This study found a positive association between physical activity, social and physical quality of life, and happiness in young people with cerebral palsy. Findings underscore the potential benefits of physical activity for the wellbeing of young people with cerebral palsy, in addition to its well-recognised physical and health benefits. Implications for Rehabilitation Physical activity is a key predictor of quality of life and happiness in young people with cerebral palsy. Physical activity is widely recognised as having physical health benefits for young people with cerebral palsy; however, this study also highlights that it may have important benefits for wellbeing, quality of life and happiness. This emphasises the need for clinical services and intervention studies aimed specifically at increasing physical activity amongst children and adolescents with cerebral palsy.

[PMID: 26218617](#)

7. *J Pediatr Surg.* 2015 Jul 2. pii: S0022-3468(15)00399-1. doi: 10.1016/j.jpedsurg.2015.06.021. [Epub ahead of print]

**Long-term and 'patient-reported' outcomes of total esophagogastric dissociation versus laparoscopic fundoplication for gastroesophageal reflux disease in the severely neurodisabled child.**

Lansdale N, McNiff M, Morecroft J, Kauffmann L, Morabito A.

AIM: Fundoplication has high failure rates in neurodisability: esophagogastric dissociation (TOGD) has been proposed as an alternative. This study aimed to compare the long-term and 'patient-reported' outcomes of TOGD and laparoscopic fundoplication (LapFundo). METHODS: Matched cohort comparison comprises (i) retrospective analysis from a prospective database and (ii) carer questionnaire survey of symptoms and quality of life (CP-QoL-Child). Children were included if they had severe neurodisability (Gross Motor Function Classification System five) and spasticity. RESULTS: Groups were similar in terms of previous surgery and comorbidities. The TOGD group was younger (22 vs. 31.5 months,  $p=0.038$ ) with more females (18/23 vs. 11/24,  $p=0.036$ ). TOGD was more likely to require intensive care: operative time, length of stay and time to full feeds were all longer ( $p<0.0001$ ). Median follow-up was 6.3 and 5.8 years. Rates of complications were comparable. Symptom recurrence (5/24 vs. 1/23,  $p=0.34$ ) and use of acid-reducing medication (13/24 vs. 4/23,  $p=0.035$ ) were higher for LapFundo. Carer-reported symptoms and QoL were similar. CONCLUSIONS: TOGD had similar efficacy to LapFundo (with suggestion of lower failure), with comparable morbidity and carer-reported outcomes. However, TOGD was more 'invasive,' requiring longer periods of rehabilitation. Families should be offered both procedures as part of comprehensive preoperative counseling.

[PMID: 26210817](#)

8. *Iran J Child Neurol.* 2015 Spring;9(2):36-41.

**Effects of Neurodevelopmental Therapy on Gross Motor Function in Children with Cerebral Palsy.**

Labaf S, Shamsoddini A, Hollisaz MT, Sobhani V, Shakibae A.

OBJECTIVE: Neurodevelopmental treatments are an advanced therapeutic approach practiced by experienced occupational therapists for the rehabilitation of children with cerebral palsy. The primary challenge in children with cerebral palsy is gross motor dysfunction. We studied the effects of neurodevelopmental therapy on gross motor function in children with cerebral palsy. MATERIALS & METHODS: In a quasi-experimental design, 28 children with cerebral palsy were randomly divided into two groups. Neurodevelopmental therapy was given to a first group ( $n=15$ ) with a mean age of 4.9 years; and a second group with a mean age 4.4 years ( $n=13$ ) who were the control group. All children were evaluated with the Gross Motor Function Measure. Treatments were scheduled for three - one-hour sessions per week for 3 months. RESULTS: We obtained statistically significant differences in the values between the baseline and post treatment in two groups. The groups were significantly different in laying and rolling ( $P=0.000$ ), sitting (0.002), crawling and kneeling (0.004), and standing abilities ( $P=0.005$ ). However, there were no significant differences in walking, running, and jumping abilities between the two groups (0.090). CONCLUSION: We concluded that the neurodevelopmental treatment improved gross motor function in children with cerebral palsy in four dimensions (laying and rolling, sitting, crawling and kneeling, and standing). However, walking, running, and jumping did not improve significantly.

[PMID: 26221161](#)

9. *J Pediatr Endocrinol Metab.* 2015 Jul 25. pii: /j/jpem.ahead-of-print/jpem-2014-0527/jpem-2014-0527.xml. doi: 10.1515/jpem-2014-0527. [Epub ahead of print]

**Effects of bisphosphonates to treat osteoporosis in children with cerebral palsy: a meta-analysis.**

Kim MJ, Kim SN, Lee IS, Chung S, Lee J, Yang Y, Lee I, Koh SE.

BACKGROUND: In childhood and adolescence, some patients with cerebral palsy (CP) have long-term limited

mobility, which can lead to secondary osteoporosis. Prevention and treatment strategies have been evaluated for the management of low bone mineral density (BMD) and fragility fractures. Currently, however, there are no established guidelines for the stratification and individualization of therapeutic interventions. Recently, an increasing number of studies have reported on the use of bisphosphonates to increase BMD in various pediatric conditions, and bisphosphonates have been suggested as a method to treat osteoporosis and prevent fractures. **PURPOSE:** We performed the current meta-analysis to assess the effects of bisphosphonates on increasing BMD in children who have CP with secondary osteoporosis. **MATERIALS AND METHODS:** A search of PubMed, Cochrane, and Embase from inception to April 2014 was performed with the following keywords: (bone disease, metabolic OR osteoporosis OR osteopenia) AND (child OR pediatric OR adolescent) AND (cerebral palsy) AND (bisphosphonate). Four studies were ultimately included in the meta-analysis: one randomized, double-blinded, placebo-controlled study and three case-controlled studies. **RESULTS:** The Z-score of lumbar spine was significantly improved after bisphosphonates treatment compared with pre-treatment values (standardized mean difference [SMD], 0.799; 95% confidence interval [CI], 0.499-1.100;  $p < 0.001$ ). The Z-score of femur was also improved significantly compared with that of the baseline value (SMD, 0.748; 95% CI, 0.382-1.114;  $p < 0.001$ ). **CONCLUSIONS:** Bisphosphonates have a significant effect on improving BMD in children with CP. Further standardization of treatment protocols including treatment dosage and duration needs to be established, and long-term follow up studies are needed.

[PMID: 26214607](#)

**10. Res Dev Disabil. 2015 Jul 23;45-46:32-48. doi: 10.1016/j.ridd.2015.07.013. [Epub ahead of print]**

**Reliability of the modified Gross Motor Function Measure-88 (GMFM-88) for children with both Spastic Cerebral Palsy and Cerebral Visual Impairment: A preliminary study.**

Salavati M, Krijnen WP, Rameckers EA, Looijestijn PL, Maathuis CG, van der Schans CP, Steenbergen B.

**PURPOSE:** The aims of this study were to adapt the Gross Motor Function Measure-88 (GMFM-88) for children with Cerebral Palsy (CP) and Cerebral Visual Impairment (CVI) and to determine the test-retest and interobserver reliability of the adapted version. **METHOD:** Sixteen paediatric physical therapists familiar with CVI participated in the adaptation process. The Delphi method was used to gain consensus among a panel of experts. Seventy-seven children with CP and CVI (44 boys and 33 girls, aged between 50 and 144 months) participated in this study. To assess test-retest and interobserver reliability, the GMFM-88 was administered twice within three weeks (Mean=9 days, SD=6 days) by trained paediatric physical therapists, one of whom was familiar with the child and one who wasn't. Percentages of identical scores, Cronbach's alphas and intraclass correlation coefficients (ICC) were computed for each dimension level. **RESULTS:** All experts agreed on the proposed adaptations of the GMFM-88 for children with CP and CVI. Test-retest reliability ICCs for dimension scores were between 0.94 and 1.00, mean percentages of identical scores between 29 and 71, and interobserver reliability ICCs of the adapted GMFM-88 were 0.99-1.00 for dimension scores. Mean percentages of identical scores varied between 53 and 91. Test-retest and interobserver reliability of the GMFM-88-CVI for children with CP and CVI was excellent. Internal consistency of dimension scores lay between 0.97 and 1.00. **CONCLUSION:** The psychometric properties of the adapted GMFM-88 for children with CP and CVI are reliable and comparable to the original GMFM-88.

[PMID: 26210850](#)

**11. Int J Lang Commun Disord. 2015 Jul 27. doi: 10.1111/1460-6984.12177. [Epub ahead of print]**

**Story retelling and language ability in school-aged children with cerebral palsy and speech impairment.**

Nordberg A, Dahlgren Sandberg A, Miniscalco C.

**BACKGROUND:** Research on retelling ability and cognition is limited in children with cerebral palsy (CP) and speech impairment. **AIMS:** To explore the impact of expressive and receptive language, narrative discourse dimensions (Narrative Assessment Profile measures), auditory and visual memory, theory of mind (ToM) and non-verbal cognition on the retelling ability of children with CP and speech impairment. **METHODS & PROCEDURES:** Fifteen speaking children with speech impairment (seven girls, eight boys) (mean age = 11 years, SD = 1;4 years),

and different types of CP and different levels of gross motor and cognitive function participated in the present study. Story retelling skills were tested and analysed with the Bus Story Test (BST) and the Narrative Assessment Profile (NAP). Receptive language ability was tested with the Test for Reception of Grammar-2 (TROG-2) and the Peabody Picture Vocabulary Test - IV (PPVT-IV). Non-verbal cognitive level was tested with the Raven's coloured progressive matrices (RCPM), memory functions assessed with the Corsi block-tapping task (CB) and the Digit Span from the Wechsler Intelligence Scale for Children-III. ToM was assessed with the false belief items of the two story tests "Kiki and the Cat" and "Birthday Puppy". **OUTCOMES & RESULTS:** The children had severe problems with retelling ability corresponding to an age-equivalent of 5;2-6;9 years. Receptive and expressive language, visuo-spatial and auditory memory, non-verbal cognitive level and ToM varied widely within and among the children. Both expressive and receptive language correlated significantly with narrative ability in terms of NAP total scores, so did auditory memory. **CONCLUSION & IMPLICATIONS:** The results suggest that retelling ability in the children with CP in the present study is dependent on language comprehension and production, and memory functions. Consequently, it is important to examine retelling ability together with language and cognitive abilities in these children in order to provide appropriate support.

[PMID: 26216752](#)

**12. Early Hum Dev. 2015 Jul 25;91(10):555-558. doi: 10.1016/j.earlhumdev.2015.07.001. [Epub ahead of print]**

**Test-retest reliability of computer-based video analysis of general movements in healthy term-born infants.**

Valle SC, Støen R, Sæther R, Jensenius AR, Adde L.

**BACKGROUND:** A computer-based video analysis has recently been presented for quantitative assessment of general movements (GMs). This method's test-retest reliability, however, has not yet been evaluated. **AIMS:** The aim of the current study was to evaluate the test-retest reliability of computer-based video analysis of GMs, and to explore the association between computer-based video analysis and the temporal organization of fidgety movements (FMs).

**STUDY DESIGN:** Test-retest reliability study. **SUBJECTS:** 75 healthy, term-born infants were recorded twice the same day during the FMs period using a standardized video set-up. **OUTCOME MEASURES:** The computer-based movement variables "quantity of motion mean" (Qmean), "quantity of motion standard deviation" (QSD) and "centroid of motion standard deviation" (CSD) were analyzed, reflecting the amount of motion and the variability of the spatial center of motion of the infant, respectively. In addition, the association between the variable CSD and the temporal organization of FMs was explored. Intraclass correlation coefficients (ICC 1.1 and ICC 3.1) were calculated to assess test-retest reliability. **RESULTS:** The ICC values for the variables CSD, Qmean and QSD were 0.80, 0.80 and 0.86 for ICC (1.1), respectively; and 0.80, 0.86 and 0.90 for ICC (3.1), respectively. There were significantly lower CSD values in the recordings with continual FMs compared to the recordings with intermittent FMs ( $p < 0.05$ ). **CONCLUSION:** This study showed high test-retest reliability of computer-based video analysis of GMs, and a significant association between our computer-based video analysis and the temporal organization of FMs.

[PMID: 26217934](#)

**13. Rev Bras Ortop. 2014 May 10;49(4):359-363.**

**Focal treatment of spasticity using botulinum toxin A in cerebral palsy cases of GMFCS level V: evaluation of adverse effects.**

Tedesco AP, Martins JS, Nicolini-Panisson RD.

**OBJECTIVE:** To report on the experience of injections of botulinum toxin A (BTA) in a series of patients with cerebral palsy of Gross Motor Function Classification System (GMFCS) level V. **METHODS:** This was a retrospective case series study on 33 patients with cerebral palsy of GMFCS level V who received 89 sessions of BTA application (of which 84 were Botox® and five were other presentations), in which the basic aim was to look for adverse effects. **RESULTS:** The mean number of application sessions per patient was three, and the mean age at the time of each injection was 4 + 6 years (range: 1.6-13 years). The muscles that most frequently received

injections were the gastrocnemius, hamstrings, hip adductors, biceps brachii and finger flexors. The mean total dose was 193 U and the mean dose per weight was 12.5 U/kg. Only one patient received anesthesia for the injections and no sedation was used in any case. No local or systemic adverse effects were observed within the minimum follow-up of one month. **CONCLUSION:** The absence of adverse effects in our series was probably related to the use of low doses and absence of sedation or anesthesia. According to our data, BTA can be safely used for patients with cerebral palsy of GMFCS level V, using low doses and preferably without sedation or anesthesia.

[PMID: 26229827](#)

**14. Dev Med Child Neurol. 2015 Jul 26. doi: 10.1111/dmcn.12857. [Epub ahead of print]**

**Neurodevelopmental outcome after neonatal perforator stroke.**

Ecury-Goossen GM, van der Haer M, Smit LS, Feijen-Roon M, Lequin M, de Jonge RC, Govaert P, Dudink J.

**AIM:** To assess outcome after neonatal perforator stroke in the largest cohort to date. **METHOD:** Survivors from a cohort of children diagnosed with neonatal perforator stroke using cranial ultrasound or magnetic resonance imaging were eligible for inclusion. Recovery and Recurrence Questionnaire score, presence of cerebral palsy (CP), and crude outcome were assessed, specifically (1) the ability to walk independently, (2) participation in regular education, and (3) the presence of epilepsy. **RESULTS:** Thirty-seven patients (20 males, 17 females) aged 3 to 14 years (mean age 8y) were included in the study: 14 with isolated single perforator stroke, four with multiple isolated perforator strokes, and 19 with additional brain injury. Out of 18 children with isolated perforator stroke(s), four had CP, one could not walk independently, and one developed epilepsy. The posterior limb of the internal capsule was involved in four out of 18 patients; three of these patients had CP. Of 19 children with additional brain injury, 11 had CP and three were not able to walk independently. Three out of nine children with concomitant cortical middle cerebral artery stroke developed epilepsy. **INTERPRETATION:** Perforator stroke patterns can be of use in predicting long-term outcome and for guiding counselling and surveillance. Motor outcome was favourable in children with isolated perforator stroke(s), except when the posterior limb of the internal capsule was involved.

[PMID: 26212612](#)

**15. No Shinkei Geka. 2015 Aug;43(8):681-90. doi: 10.11477/mf.1436203102.**

**[Intrathecal Baclofen Therapy for Cerebral Palsy]. [Article in Japanese]**

Kishima H.

Baclofen intrathecal administration (intrathecal baclofen: ITB) therapy has elapsed is about nine years from when the insurance application in Japan, has become a place where it is widely known for its effect. ITB therapy is a treatment that is administered continuously to intrathecal using the agonist baclofen pump in the body implantable is of GABA-B receptor. Against paralysis and tension of dyskinesias associated with spasticity, by relieving the symptoms, it is possible to obtain improved motor function and ADL. Baclofen is often not exhibit sufficient pharmacological effect by side effects such as drowsiness oral administration, and by administered intrathecally, to obtain improved dramatic spasticity in a dosage of about 1% of the oral thing I can. Has been enforced ITB therapy against 1,000 cases or more of patients in Japan, it has established an important position as a treatment for these diseases. Cerebral Palsy Among them is an adaptive disease of numerous ITB therapy along with spasticity and spastic paralysis after spinal cord injury. Outline of ITB therapy for cerebral palsy in this paper, surgery, effect, complications, such as the maintenance method will be described in.

[PMID: 26224461](#)

**16. Neurol Med Chir (Tokyo). 2015 Jul 31. [Epub ahead of print]****Neurosurgical Management of Childhood Spasticity: Functional Posterior Rhizotomy and Intrathecal Baclofen Infusion Therapy.**

Morota N, Ihara S, Ogiwara H.

A paradigm shift is currently ongoing in the treatment of spasticity in childhood in Japan. Functional posterior rhizotomy (FPR), which was first introduced to Japan in 1996, is best indicated for children with spastic cerebral palsy, regardless of the clinical severity of spasticity. Surgery is generally carried out in the cauda equina, where the posterior root is separated from the anterior one, and neurophysiological procedures are used to judge which nerve root/rootlet should be cut. The outcome of FPR is favorable for reducing spasticity in the long-term follow-up. Intrathecal baclofen (ITB) treatment for childhood spasticity was approved in 2007 in Japan and the number of children undergoing ITB pump implantation has been gradually increasing. ITB treatment is best indicated for children with severe spasticity, especially those with dystonia, regardless of the pathological background. Since it is a surgery performed to implant foreign bodies, special attention should be paid to avoid perioperative complications such as CSF leakage, meningitis, and mechanical failure. Severely disabled children with spasticity would benefit most from ITB treatment. We would especially like to emphasize the importance of a strategic approach to the treatment of childhood spasticity. The first step is to reduce spasticity by FPR, ITB, and botulinum toxin injection. The second step is to aim for functional improvement after controlling spasticity. Traditional orthopedic surgery and neuro-rehabilitation form the second step of treatment. The combination of these treatments that allows them to complement each other is the key to a successful treatment of childhood spasticity.

[PMID: 26227057](#)

**17. Front Psychol. 2015 Jul 8;6:880. doi: 10.3389/fpsyg.2015.00880. eCollection 2015.****Navigation strategies as revealed by error patterns on the Magic Carpet test in children with cerebral palsy.**

Belmonti V, Berthoz A, Cioni G, Fiori S, Guzzetta A.

**INTRODUCTION:** Short-term memory develops differently in navigation vs. manual space. The Magic Carpet (MC) is a novel navigation test derived from the Walking Corsi Test and the manual Corsi Block-tapping Task (CBT). The MC requires mental rotations and executive function. In Cerebral Palsy (CP), CBT, and MC scores relate differently to clinical and lesional factors. Hypotheses of this study are: that frontal lesion specifically affect navigation in CP; that brain lesions affect MC cognitive strategies. **MATERIALS AND METHODS:** Twenty-two children with spastic CP, aged 5 to 14 years, 14 with a unilateral and 8 with a bilateral form, underwent the CBT and the MC. Errors were classified into seven patterns by a recently described algorithm. Brain lesions were quantified according to a novel semi-quantitative MRI scale. Control data were partially drawn from a previous study on 91 typically developing children.

**RESULTS:** Children with CP performed worse than controls on both tests. Right hemispheric impairment correlated with spatial memory. MC span was reduced less than CBT span and was more selectively related to right middle white-matter and frontal lesions. Error patterns were differently distributed in CP and in typical development, and depended on right brain impairment: children with more extensive right lesions made more positional than sequential errors. **DISCUSSION:** In CP, navigation is affected especially by extensive lesions involving the right frontal lobe. In addition, these are associated with abnormal cognitive strategies. Whereas in typical development positional errors, preserving serial order, increase with age and performance, in CP they are associated with poorer performance and more extensive right-brain lesions. The explanation may lie in lesion side: right brain is crucial for mental rotations, necessary for spatial updating. Left-lateralized spatial memory strategies, relying on serial order, are not efficient if not accompanied by right-brain spatial functions.

[PMID: 26217250](#)

## Prevention and Cure

18. *Best Pract Res Clin Obstet Gynaecol.* 2015 Jun 21. pii: S1521-6934(15)00103-0. doi: 10.1016/j.bpobgyn.2015.05.004. [Epub ahead of print]

### Pathophysiology of foetal oxygenation and cell damage during labour.

Yli BM, Kjellmer I.

A foetus exposed to oxygenation compromise is capable of several adaptive responses, which can be categorised into those affecting metabolism and those affecting oxygen transport. However, both the extent and duration of the impairment in oxygenation will have a bearing on these adaptive responses. Although intrapartum events may account for no more than one-third of cases with an adverse neurological outcome, they are important because they can be influenced successfully. This review describes the mechanisms underlying foetal hypoxia during labour, acid-base balance and gas exchange, and the current scientific understanding of the role of intrauterine asphyxia in the pathophysiology of neonatal encephalopathy and cerebral palsy. Although the mechanisms involved include similar initiating events, principally ischaemia and excitotoxicity, and similar final common pathways to cell death, there are certain unique maturational factors that influence the type and pattern of cellular injury.

[PMID: 26211833](#)

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### Animal Models of Cerebral Palsy: Hypoxic Brain Injury in the Newborn.

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**OBJECTIVE:** Hypoxic insults are implicated in the spectrum of fetal disorders, including cerebral palsy (CP). In view of the major contribution of intrapartum risk factors and prematurity to subsequent neurological morbidity and mortality in humans, this study aimed to clarify the pathophysiology of brain injury, especially periventricular white matter damage (WMD), that occur in utero to the immature and near-term fetal CNS. **MATERIALS & METHODS:** An evaluation of the resulting neurological and behavioural phenotype in the newborn was performed by utilising a battery of neurobehavioural tests, including the Morris water-maze and the open-field test, followed by cerebral MRI and histopathology. **RESULTS:** This study used a murine model to examine the deleterious effects of WMD brought about by cerebral hypoxia-ischemia (HI) and the characteristic features of CP in mice. Murine models have proven themselves valuable in the area of experimental neuroscience. **CONCLUSION:** Hypoxia-treated mice were observed to demonstrate a significant neurofunctional deficit compared with sham mice on two behavioral measures. Indeed, different brain regions, including the sensorimotor cortex, the striatum, and the hippocampus were noticeably damaged after HI insult, as determined by both MRI and histopathology. These results, albeit qualitative in nature, appear to support the pre-existing finding that the long-term neurofunctional outcome in animal subjects with CP is strongly associated with the anatomical extent and pattern of cerebral damage as determined by both delayed neuroimaging and histopathology.

[PMID: 26221157](#)