Science Infos
Paralysie Cérébrale

N°25- JUILLET 2016

Focus

Journée Mondiale de la Paralysie Cérébrale
Mercredi 5 Octobre 2016

Nous sommes très heureux, pour la Journée Mondiale de la Paralysie Cérébrale et les 10 ans de notre fondation, de vous inviter à rencontrer les chercheurs lauréats 2016 et assister à la remise de leurs bourses de recherche sur la Paralysie Cérébrale qui sera faite en présence de Madame Ségolène Neuville, Secrétaire d'État auprès de la ministre des Affaires sociales et de la Santé, chargée des Personnes handicapées et de la Lutte contre l'exclusion. Vous pourrez assister à la présentation de ces projets, de leur impact attendu et poser vos questions aux chercheurs. A cette occasion nous aurons le plaisir de vous présenter notre Fondation, les recherches financées et l'enquête ESPaCe sur la rééducation que nous venons de lancer.*

Nous vous attendons nombreux

Mercredi 5 octobre 2016 à 18h
à la Cité Internationale de Paris, salon David Weil, 17 Bd Jourdan 75014 Paris
(Métro et tramway Cité Universitaire)

Dr Nathalie Genes
Directeur Scientifique

Dr Alain Chatelin
Président

Entrée libre à 18h précises, fin de la cérémonie à 20h.
Réservez au 01 45 54 03 03 ou mail to secretariat@lafondationmotrice.org

Cette journée permet d'informer et de sensibiliser le grand public et les professionnels sur cette pathologie ainsi que sur les conséquences pour les personnes atteintes. Dans plus de 60 pays, elle rassemble des organisations autour de la Paralysie Cérébrale. L'objectif est de faire connaître, échanger et recueillir des idées sur cette pathologie et mettre les meilleures d'entre elles en pratique. Pour plus d'informations : worldcpday.org
Ensemble, familles, chercheurs, donateurs nous pouvons agir sur le futur.

**Sous réserve d'agenda*

1ÈRE ENQUÊTE NATIONALE SUR LES SOINS REÇUS, BESOINS PERÇUS, LES PRIORITÉS ET AMÉLIORATIONS ATTENDUES EN RÉÉDUCATION MOTRICE, RAPPORTÉS PAR LES PERSONNES ATTEINTES DE PARALYSIE CÉRÉBRALE* ET LEUR FAMILLE EN FRANCE

LA FONDATION MOTRICE
RECHERCHE SUR LA PARALYSIE CÉRÉBRALE

En partenariat avec :

F.F.A.I.M.C.
Fédération Française des Associations d'Infirmes Moteurs Cérébraux

vous propose de participer à une enquête nationale sur la rééducation motrice en Paralysie Cérébrale*.

Vous êtes concernés ?
Nous avons besoin de votre avis !
Pour participer Rendez-vous sur
www.lafondationmotrice.org

*on utilise aussi les termes de PC et Infirmité Motrice Cérébrale (IMC).

Pour plus d'informations, consulter la brochure ou le site de la Fondation Motrice.

SOUS L'ÉGIDE DES SOCIÉTÉS SAVANTES :

sferhe
Société Francophone d'Etudes et de Recherche sur les Handicaps de l'enfant

sfnp
Société Française de Neuro-Pédiatrie

SOFMER
Société Française de Médecine Physique et de Réadaptation

Cercle de Documentation et d'Information pour la rééducation des Infirmes Moteurs Cérébraux

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Domotique

Manifestations et congrès

Septembre 2016

AACPDM 70th Annual Meeting
20-24 Septembre 2016
Hollywood,Florida, USA
http://www.aacpdm.org/meetings/2016

European paediatric stoke symposium
Neonatal Arteriel Ischemic Stroke (NAIS from birth to childhood)
21-22 septembre 2016
Saint Etienne, France
http://www.chu-st-etienne.fr/avcpediatrie/
http://www.swiss-paediatrics.org/sites/default/files/2016.09.21_proamme_congres_avc_enfantv2.pdf

6th International Conference on Clinical Neonatology
22-24 Septembre 2016
Turin, Italie
https://www.eiseverywhere.com/ehome/105597/234360/

21ème congrès du GEIMOC
24 septembre 2016
Belgique
http://www.fondationparalysiecerebrale.org/sites/default/files/Lettre%20%20publicit%C3%A9%202016_1.pdf

Octobre 2016

31ème Congrès de la Société française de Médecine Physique et de réadpatation (SOFMER)
13-15 Octobre 2016
Saint Etienne, France
http://saint-etienne.sofmer2016.com/

Novembre 2016

Journées d'études,Polyhandicap 2016
21-22 novembre 2016
Paris, France
http://www.institutmc.org/index.php/journees-d-etudes-polyhandicap-2016-21-et-22-novembre-2016

Décembre 2016

Journées d'Etude annuelles du CDI
12-13 décembre 2016
Paris , France
http://www.institutmc.org/index.php/journee-d-etude-annuelles-du-cdi-12-et-13-decembre-2016

Mai 2017

29th Annual EACD Meeting,7-20 May, 2017, Amsterdam
17-20 mai 2017
Amsterdam, pays bas

Publications scientifiques

Méthodologie de la recherche

Le profil de veille a été mis en place sur Pubmed avec le mot clé "Cerebral Palsy" pour des publications majoritairement en français ou en anglais, avec abstract ou full text
Free article indique le lien vers les articles dont le texte intégral est librement disponible

Application of the International Classification of Functioning, Disability and Health - Children and Youth in Children With Cerebral Palsy.
Jeevanantham D
Indian Pediatr. 2016 Jun 1. pii: S097475591600011. [Epub ahead of print]

The International Classification of Functioning, Disability and Health (ICF) is a framework for describing health status; however, there is a gap in literature for supporting its use as a classification tool. The purpose of this paper is to provide a perspective on its use in describing children with cerebral palsy. The interconnected concepts of the ICF are more important than the classification elements itself. Further research is required to prove its use as a classification tool in clinical practice.
PMID: 27395840 [PubMed - as supplied by publisher]

Epidémiologie

Prévalence- Incidence

[Neurodevelopmental outcome at 3 years of age of infants born at less than 26 weeks]. [Article in French]
Delmas O, Garcia P, Bernard V, Fabre M, Vialet R, Boubred F,Fayol L.
Arch Pediatr. 2016 Jul 14. pii: S0929-693X(16)30286-X. doi: 10.1016/j.arcped.2016.06.004. [Epub ahead of print]

OBJECTIVE: To describe the neurodevelopmental outcome and perinatal factors associated with favorable outcome among extremely preterm children at 3 years of age.
METHODS: All infants born before 26 weeks of gestation between 2007 and 2011, admitted to intensive care units participating in a French regional network (western PACA-southern Corsica) were included. Perinatal data were collected to assess the main neonatal morbidities. At 3 years of age, the children's neurodevelopment was assessed by trained physicians participating in the follow-up network. Children were classified according to their disability: none, moderate, or severe. Using logistic regression, we determined the perinatal factors associated with the absence of disability at 3 years of age.
RESULTS: One hundred and sixty-two very preterm newborns were admitted to neonatal intensive care units. At discharge the survival rate was 62% (101). Rates of survival increased with gestational age (33% at 23 weeks, 57% at 24 weeks and 68% at 25 weeks). Among the 101 surviving extremely preterm children, 66 were evaluated at 3 years. The perinatal characteristics were not significantly different from those of the children lost to follow-up. Overall, 56% of extremely preterm children had no disability and 6% had severe disability. Cerebral palsy was diagnosed in 13% of children. At 3 years of age, the main perinatal factors associated with no disability were short duration of

mechanical ventilation (OR=0.96 [0.93-0.99]; P=0.03) and complete course of prenatal corticosteroids (OR=4.7 [1.2-17.7]; P=0.02).
CONCLUSION: As mortality rates continue to decrease for very preterm infants, concerns are rising about their long-term outcome. In this high-risk population, improving perinatal care remains a challenge to improve long-term outcome.

DOI: 10.1016/j.arcped.2016.06.004
PMID: 27424937 [PubMed - as supplied by publisher]

Facteurs de risque – Causes

Altered autonomic control in preterm newborns with impaired neurological outcomes.
Thiriez G, Mougey C, Vermeylen D, Wermenbol V, Lanquart JP, Lin JS, Franco P.
Clin Auton Res. 2015 Aug;25(4):233-42. doi: 10.1007/s10286-015-0298-6. Epub 2015 Aug 8.

PURPOSE: Very preterm newborns are at high risk of neurological injury. The objective of this work was to study the impact of neurological aggression on the autonomic nervous system.
METHODS: We studied polysomnography recordings, at term corrected gestational age, for 38 preterm infants born at less than 28 weeks or weighing less than 1 kg. These infants were seen by a neuropediatrician, average age at follow up was 54.4 months. We created two groups: one with children who did not have any neurological disorder, including cerebral palsy (CP), language or mental retardation, visual or hearing disability, and attention disorder; the second group contained children with at least one of these impairments. From the polysomnography recordings, using coarse-graining spectral analysis, we compared heart rate variability indices between preterm infants with normal and abnormal neurological outcomes.
RESULTS: Twenty infants had an impaired neurological outcome. Regarding the clinical characteristics, there were more babies born from smoking mothers ($p = 0.025$), with early-onset neonatal sepsis ($p = 0.04$), and abnormal results on cerebral magnetic resonance imaging ($p = 0.014$) in the group with impaired neurological outcomes. Spectral parameters were significantly different between active and quiet sleep. Total powers, harmonic and non-harmonic powers, high frequency and low frequency powers were higher in active sleep compared with those in quiet sleep. Preterm babies with impaired neurological development, in particular those with CP, had lower total power and non-harmonic power especially in active sleep than those with normal neurological outcome.
CONCLUSION: These findings suggest that, in very preterm infants, perinatal neurological injuries could be associated with abnormal maturation of the autonomic nervous system.
DOI: 10.1007/s10286-015-0298-6
PMID: 26253935 [PubMed - indexed for MEDLINE]

A Snapshot of 1001 Children Presenting with Cerebral Palsy to a Children's Disability Hospital.
Banskota B, Shrestha S, Rajbhandari T, Banskota AK, Spiegel DA.
J Nepal Health Res Counc. 2015 Jan-Apr;13(29):31-7.

BACKGROUND: Cerebral palsy (CP) has largely been an unaddressed problem in low and middle income countries (LMIC's). The purpose of this retrospective study is to provide a facility-based snapshot of CP in Nepal.
METHODS: A retrospective chart review of 1001 patients diagnosed as having cerebral palsy, presenting to our institution from December 2008 to December 2011, was carried out.
RESULTS: Majority of cases were found to be a result of birth complications and post-natal infections. Most children with CP were born at home, presented after walking age and came from socioeconomically unstable or borderline households. Less than 20% were attending school. Spastic diplegia was the most common presentation. Children with post-natal spasticity secondary to infection seemed to retain greater ambulatory potential.
CONCLUSIONS: In contrast to CP in developed countries, the etiology in LMIC's is largely related to birth-related complications and post-natal infections. There is an urgent need to address preventable causes of cerebral palsy in Nepal.
PMID: 26411710 [PubMed - indexed for MEDLINE]

Association of severe placental inflammation with death prior to discharge and cerebral palsy in preterm infants.
Huetz N, Triau S, Leboucher B, Sentilhes L, Hanf M, Nguyen S, Flamant C, Roze JC, Gascoin G
BJOG. 2016 Jul 18. doi: 10.1111/1471-0528.14177. [Epub ahead of print]

OBJECTIVE: The objective of our study was to identify placental patterns associated with death before discharge or cerebral palsy in a large cohort of preterm infants with a high follow-up rate at 2 years of corrected age.
DESIGN: Population-based monocentric study.
SETTINGS: Monocentric study in the maternity unit of the University Hospital of Angers, France between 24(+0) and 33(+6) weeks of gestation, between January 2008 and December 2011.
POPULATION: All singleton infants born alive with a placental examination were eligible.
METHODS: Clinical data (obstetric and neonatal) were collected prospectively through the LIFT cohort. Placental data were collected retrospectively from medical records. The main outcome measure was death before discharge or cerebral palsy.
RESULTS: We did not find any significant association between severe inflammatory lesions on the placenta and death [odds ratio (OR) 1.49; 95% CI 0.55-4.01; P = 0.43] or cerebral palsy (OR 1.41; 95% CI 0.43-4.62; P = 0.57). This lack of significant association persisted even after adjustment (aOR 0.9; 95% CI 0.20-2.30; P = 0.54; aOR 0.98; 95% CI 0.27-3.58; P = 0.97).
CONCLUSION: Our results do not provide evidence for a significant association between severe inflammatory placental lesions and either death before discharge or cerebral palsy at 2 years of corrected age in preterm infants born at <34 weeks of gestational age. Further studies remain necessary to confirm this result.
TWEETABLE ABSTRACT: We found no significant association between inflammatory placental lesions and death or cerebral palsy.

DOI: 10.1111/1471-0528.14177
PMID: 27428037 [PubMed - as supplied by publisher]

Birthweight Extremes and Neonatal and Childhood Outcomes after Preterm Premature Rupture of Membranes.
Grace MR, Dotters-Katz S, Varner MW, Boggess K, Manuck TA
Am J Perinatol. 2016 Jul 1. [Epub ahead of print]

Objective To determine the association between birthweight extremes and risk of adverse neonatal and childhood outcomes following preterm premature rupture of membranes (PPROM).
Study Design This is a secondary analysis of data from the Beneficial Effects of Antenatal Magnesium Sulfate Trial. Women with nonanomalous singletons and PPROM delivering ≥24.0 weeks were included. Birthweight was lassified as small for gestational age (SGA), appropriate for gestational age (AGA), or large for gestational age (LGA). Composite severe neonatal morbidity and childhood outcomes at age 2, were compared between these groups. Results One thousand five hundred and ninety-eight infants were included (58 SGA, 1,354 AGA, and 186 LGA). There was an inverse relationship between birthweight and rate of composite major neonatal morbidity (55.2% of SGA, 31.5% of AGA, 18.3% of LGA, $p < 0.001$). Former-SGA children were more likely to be diagnosed with major composite childhood morbidity at age 2 (25.9% of SGA, 8.3% of AGA, 5.9% of LGA, $p < 0.001$). In multivariate models, LGA infants had improved initial neonatal outcomes compared with AGA infants (adjusted odds ratio [aOR], 0.44; 95% confidence interval [CI], 0.28-0.71; $p = 0.001$). Conclusions Among infants delivered following PPROM, those who were LGA at delivery had improved composite adverse neonatal outcomes. SGA increases the risk of severe neonatal morbidity, early childhood death, and moderate/severe cerebral palsy at age 2.
Thieme Medical Publishers 333 Seventh Avenue, New York, NY 10001, USA.
DOI: 10.1055/s-0036-1584898
PMID: 27367280 [PubMed - as supplied by publisher]

Chorioamnionitis and Neurocognitive Development at Age 2 Years.
Vander Haar E, Gyamfi-Bannerman C.
Obstet Gynecol. 2016 Mar;127(3):437-41. doi: 10.1097/AOG.0000000000001295.

OBJECTIVE: To evaluate whether chorioamnionitis is associated with decreased Bayley II scores at age 2 years.

METHODS: We conducted an observational cohort study of women and their offspring enrolled in the Eunice Kennedy Shriver National Institute of Child Health and Development's Maternal-Fetal Medicine Units Network multicenter, randomized controlled trial of magnesium for cerebral palsy prevention in pregnancies at high risk for early preterm delivery. We included nonanomalous singleton gestations and excluded pregnancies missing outcome or exposure data. Our primary exposure was chorioamnionitis, defined by the clinical diagnosis of chorioamnionitis and a maternal fever greater than 100°F. Our primary outcome was a Bayley II Mental Developmental Index score less than 70 or Psychomotor Developmental Index score less than 70 assessed at age 2 years. We also assessed Mental Developmental Index or Psychomotor Developmental Index score less than 85. We conducted bivariate analyses and fit a log-linear regression model, adjusting for related to Mental Developmental Index or Psychomotor Developmental Index score less than 70 or less than 85 with a detectable effect size estimated at a relative risk of 1.5 or greater.
RESULTS: Of 1,574 patients in our analysis, 194 (12%) had chorioamnionitis and 1,366 (87%) had preterm premature rupture of membranes. The mean gestational age at delivery was 29 3/7 weeks. There were no significant differences in Mental Developmental Index score less than 70 (37 [19.1%] compared with 233 [17%], P=.45) or Psychomotor Developmental Index score less than 70 (29 [15%] compared with 195 [14%] P=.76) for children born to mothers with or without chorioamnionitis, respectively. After adjusting for confounders, there remained no difference in the proportion of abnormal scores in either group. However, neonates diagnosed with sepsis were found to have significantly decreased Mental Developmental Index scores.
CONCLUSION: Exposure to chorioamnionitis was not associated with neurocognitive defects as measured by abnormal Bayley II scores.
DOI: 10.1097/AOG.0000000000001295
PMID: 26855093 [PubMed - indexed for MEDLINE]

Does Infection During Pregnancy Outside of the Time of Delivery Increase the Risk of Cerebral Palsy?
Brookfield KF, Osmundson SS, Caughey AB, Snowden JM
Am J Perinatol. 2016 Jul 11. [Epub ahead of print]

Objective We sought to evaluate whether maternal antepartum infection (excluding chorioamnionitis) is associated with cerebral palsy (CP). Study Design ;This is a secondary analysis from a multicenter trial in women at risk of preterm delivery who received antenatal magnesium sulfate versus placebo. We compared the risk of CP in the children of women who had evidence of antepartum infection over the course of pregnancy to those women who had no evidence of antepartum infection during pregnancy.
Results Within a cohort of 2,251 women who met our inclusion criteria, 1,350 women had no history of infection in pregnancy and 801 women had a history of some type of antepartum infection during pregnancy. The incidence of CP was similar between the two groups (4.9 vs 5.0%; p = 0.917). After adjustment for maternal and obstetric confounders, we observed no significantly increased risk of CP among infants born to women with evidence of antepartum infection; (adjusted relative risk [aRR], 1.09 (0.72, 1.66); p = 0.68).
Conclusion Compared with women with no evidence of antepartum infection during pregnancy, those women with infections excluding chorioamnionitis may not be at an increased risk of delivering an infant with CP.
Thieme Medical Publishers 333 Seventh Avenue, New York, NY 10001, USA.
DOI: 10.1055/s-0036-1585411
PMID: 27398702 [PubMed - as supplied by publisher]
PMID: 27352940 [PubMed - as supplied by publisher]

Immediate versus deferred delivery of the preterm baby with suspected fetal compromise for improving outcomes.
Stock SJ, Bricker L, Norman JE, West HM.
Cochrane Database Syst Rev. 2016 Jul 12;7:CD008968.

BACKGROUND: Immediate delivery of the preterm fetus with suspected compromise may decrease the risk of damage due to intrauterine hypoxia. However, it may also increase the risks of prematurity.
OBJECTIVES: To assess the effects of immediate versus deferred delivery of preterm babies with suspected fetal compromise on neonatal, maternal and long-term outcomes.

SEARCH METHODS: We searched the Cochrane Pregnancy and Childbirth Group's Trials Register (30 April 2016) and reference lists of retrieved studies.
SELECTION CRITERIA: Randomised trials comparing a policy of immediate delivery with deferred delivery or expectant management in preterm fetuses with suspected in utero compromise. Quasi-randomised trials and trials employing a cluster-randomised design were eligible for inclusion but none were identified.
DATA COLLECTION AND ANALYSIS: Two review authors independently assessed trials for inclusion and risk of bias, extracted data and checked them for accuracy. MAIN RESULTS: We included one trial of 548 women (588 babies) in the review. Women with pregnancies between 24 and 36 weeks' gestation took part. The study took place in 13 European countries, between 1993 and 2001. The difference in the median randomisation to delivery interval between immediate delivery and deferred delivery was four days (median: 0.9 (inter-quartile range (IQR) 0.4 to 1.3) days for immediate delivery, median: 4.9 (IQR 2.0 to 10.8) days in the delay group).There was no clear difference in the primary outcomes of extended perinatal mortality (risk ratio (RR) 1.17, 95% confidence interval (CI) 0.67 to 2.04, one trial, 587 babies, moderate-quality evidence) or the composite outcome of death or disability at or after two years of age (RR 1.22, 95% CI 0.85 to 1.75, one trial, 573 babies, moderate-quality evidence) with immediate delivery compared to deferred delivery. The results for these outcomes are consistent with both appreciable benefit and harm. More babies in the immediate delivery group were ventilated for more than 24 hours (RR 1.54, 95% CI 1.20 to 1.97, one trial, 576 babies). There were no differences between the immediate delivery and deferred delivery groups in any other infant mortality outcome (stillbirth, neonatal mortality, postneonatal mortality > 28 days to discharge), individual neonatal morbidity or markers of neonatal morbidity (cord pH less than 7.00, Apgar less than seven at five minutes, convulsions, interventricular haemorrhage or germinal matrix haemorrhage, necrotising enterocolitis and periventricular leucomalacia or ventriculomegaly).Some important outcomes were not reported, in particular infant admission to neonatal intensive care or special care facility, and respiratory distress syndrome. We were not able to calculate composite rates of serious neonatal morbidity, even though individual morbidities were reported, due to the risk of double counting infants with more than one morbidity.More children in the immediate delivery group had cerebral palsy at or after two years of age (RR 5.88, 95% CI 1.33 to 26.02, one trial, 507 children). There were, however, no differences in neurodevelopment impairment at or after two years (RR 1.72, 95% CI 0.86 to 3.41, one trial, 507 children), death at or after two years of age (RR 1.04, 95% CI 0.66 to 1.63, one trial, 573 children), or death or disability in childhood (six to 13 years of age) (RR 0.82, 95% CI 0.48 to 1.40, one trial, 302 children). More women in the immediate delivery group had caesarean delivery than in the deferred delivery group (RR 1.15, 95% CI 1.07 to 1.24, one trial, 547 women, high-quality evidence). Data were not available on any other maternal outcomes.There were several methodological weaknesses in the included study, and the level of evidence for the primary outcomes was graded high for caesarean section and moderate for extended perinatal mortality and death or disability at or after two years. The evidence was downgraded because the CIs for these outcomes were wide, and were consistent with both appreciable benefit and harm. Bias may have been introduced by several factors: blinding was not possible due to the nature of the intervention, data for childhood follow-up were incomplete due to attrition, and no adjustment was made in the analysis for the non-independence of babies from multiple pregnancies (39 out of 548 pregnancies). This study only included cases of suspected fetal compromise where there was uncertainty whether immediate delivery was indicated, thus results must be interpreted with caution.
AUTHORS' CONCLUSIONS: Currently there is insufficient evidence on the benefits and harms of immediate delivery compared with deferred delivery in cases of suspected fetal compromise at preterm gestations to make firm recommendations. There is a lack of trials addressing this question, and limitations of the one included trial means that caution must be used in interpreting and generalising the findings. More research is needed to guide clinical practice.Although the included trial is relatively large, it has insufficient power to detect differences in neonatal mortality. It did not report any maternal outcomes other than mode of delivery, or evaluate maternal satisfaction or economic outcomes. The applicability of the findings is limited by several factors: Women with a wide range of obstetric complications and gestational ages were included, and subgroup analysis is currently limited. Advances in Doppler assessment techniques may diagnose severe compromise more accurately and help make decisions about the timing of delivery. The potential benefits of deferring delivery for longer or shorter periods cannot be presumed.Where there is uncertainty whether or not to deliver a preterm fetus with suspected fetal compromise, there seems to be no benefit to immediate delivery. Deferring delivery until test results worsen or increasing gestation favours delivery may improve the outcomes for mother and baby.There is a need for high-quality randomised controlled trials comparing immediate and deferred delivery where there is suspected fetal compromise

at preterm gestations to guide clinical practice. Future trials should report all important outcomes, and should be adequately powered to detect differences in maternal and neonatal morbidity and mortality.
DOI: 10.1002/14651858.CD008968.pub3
PMID: 27404120 [PubMed - as supplied by publisher]

Infants at risk of cerebral palsy: a systematic review of outcomes used in Cochrane studies of pregnancy, childbirth and neonatology.
Hines M, Swinburn K, McIntyre S, Novak I, Badawi N
J Matern Fetal Neonatal Med. 2015 Nov;28(16):1871-83. doi: 10.3109/14767058.2014.972355. Epub 2014 Nov 11.

OBJECTIVE: To systematically review meta-analyses (MAs) and randomised controlled trials (RCTs) of interventions for infants at risk of cerebral palsy (CP), to determine if consensus exists in study end-points.
METHODS: MAs within the "Neonatal" and "Pregnancy and Childbirth" Review Groups in Cochrane Database of Systematic Reviews (to June 2011) were included if they contained risk factors for CP as a study end-point, and were either published in 2010 or 2011 or cited >20 times in Sciverse Scopus. Up to 20 RCTs from each MA were included. Outcome measures, definitions and cut-points for ordinal groupings were extracted from MAs and RCTs and frequencies calculated.
RESULTS: Twenty-two MAs and 165 RCTs were appraised. High consistency existed in types of outcome domains listed as important in MAs. For 10/16 most frequently cited outcome domains, <50% of RCTs contributed data for meta-analyses. Low consistency in outcome definitions, measures, cut-points in RCTs and long-term follow-up prohibited data aggregation.
CONCLUSIONS: Variation in outcome measurement and long-term follow up has hampered the ability of RCTs to contribute data on important outcomes for CP, resulting in lost opportunities to measure the impact of maternal and neonatal interventions. There is an urgent need for and long-term follow up of these interventions and an agreed set of standardised and clinically relevant common data elements for study end-points.
DOI: 10.3109/14767058.2014.972355
PMID: 25283846 [PubMed - indexed for MEDLINE]

Neonatal Mortality and Long-Term Outcome of Infants Born between 27 and 32 Weeks of Gestational Age in Breech Presentation: The EPIPAGE Cohort Study.
Azria E, Kayem G, Langer B, Marchand-Martin L, Marret S, Fresson J Pierrat V, Arnaud C, Goffinet F, Kaminski M, Ancel PY; EPIPAGE study group.
PLoS One. 2016 Jan 8;11(1):e0145768. doi: 10.1371/journal.pone.0145768. eCollection 2016.

OBJECTIVE: To determine whether breech presentation is an independent risk factor for neonatal morbidity, mortality, or long-term neurologic morbidity in very preterm infants.
DESIGN: Prospective population-based cohort.
POPULATION: Singletons infants without congenital malformations born from 27 to 32 completed weeks of gestation enrolled in France in 1997 in the EPIPAGE cohort.
METHODS: The neonatal and long-term follow-up outcomes of preterm infants were compared between those in breech presentation and those in vertex presentation. The relation of fetal presentation with neonatal mortality and neurodevelopmental outcomes was assessed using multiple logistic regression models.
RESULTS: Among the 1518 infants alive at onset of labor included in this analysis (351 in breech presentation), 1392 were alive at discharge. Among those eligible to follow up and alive at 8 years, follow-up data were available for 1188 children. Neonatal mortality was significantly higher among breech than vertex infants (10.8% vs. 7.5%, P = 0.05). However the differences were not significant after controlling for potential confounders. Neonatal morbidity did not differ significantly according to fetal presentation. Severe cerebral palsy was less frequent in the group born in breech compared to vertex presentation but there was no difference after adjustment. There was no difference according to fetal presentation in cognitive deficiencies/learning disabilities or overall deficiencies.
CONCLUSION: Our data suggest that breech presentation is not an independent risk factor for neonatal mortality or long-term neurologic deficiencies among very preterm infants.
Free PMC Article
DOI: 10.1371/journal.pone.0145768
PMCID: PMC4706444

PMID: 26744838 [PubMed - indexed for MEDLINE]

Parechovirus Encephalitis and Neurodevelopmental Outcomes.
Britton PN, Dale RC, Nissen MD, Crawford N, Elliott E, Macartney K, Khandaker G, Booy R, Jones CA; PAEDS-ACE Investigators.
Pediatrics. 2016 Feb;137(2):e20152848. doi: 10.1542/peds.2015-2848. Epub 2016 Jan 20.

OBJECTIVE: We aimed to describe the clinical features and outcome of human parechovirus (HPeV) encephalitis cases identified by the Australian Childhood Encephalitis (ACE) study.
METHODS: Infants with suspected encephalitis were prospectively identified in 5 hospitals through the (ACE) study. Cases of confirmed HPeV infection had comprehensive demographic, clinical, laboratory, imaging, and outcome at discharge data reviewed by an expert panel and were categorized by using predetermined case definitions. Twelve months after discharge, neurodevelopment was assessed by using the Ages and Stages Questionnaire (ASQ).
RESULTS: We identified thirteen cases of suspected encephalitis with HPeV infection between May 2013 and December 2014. Nine infants had confirmed encephalitis; median age was 13 days, including a twin pair. All had HPeV detected in cerebrospinal fluid with absent pleocytosis. Most were girls (7), admitted to ICU (8), and had seizures (8). Many were born preterm (5). Seven patients had white matter diffusion restriction on MRI; 3 with normal cranial ultrasounds. At discharge, 3 of 9 were assessed to have sequelae; however, at 12 months' follow-up, by using the ASQ, 5 of 8 infants showed neurodevelopmental sequelae: 3 severe (2 cerebral palsy, 1 central visual impairment). A further 2 showed concern in gross motor development.
CONCLUSIONS: Children with HPeV encephalitis were predominantly young, female infants with seizures and diffusion restriction on MRI. Cranial ultrasound is inadequately sensitive. HPeV encephalitis is associated with neurodevelopmental sequelae despite reassuring short-term outcomes. Given the absent cerebrospinal fluid pleocytosis and need for specific testing, HPeV could be missed as a cause of neonatal encephalopathy and subsequent cerebral palsy.

DOI: 10.1542/peds.2015-2848
PMID: 26791970 [PubMed - indexed for MEDLINE]

Planned Repeat Cesarean Section at Term and Adverse Childhood Health Outcomes: A Record-Linkage Study.
Black M, Bhattacharya S, Philip S, Norman JE, McLernon DJ.
PLoS Med. 2016 Mar 15;13(3):e1001973. doi: 10.1371/journal.pmed.1001973. eCollection 2016.

BACKGROUND: Global cesarean section (CS) rates range from 1% to 52%, with a previous CS being the commonest indication. Labour following a previous CS carries risk of scar rupture, with potential for offspring hypoxic brain injury, leading to high rates of repeat elective CS. However, the effect of delivery by CS on long-term outcomes in children is unclear. Increasing evidence suggests that in avoiding exposure to maternal bowel flora during labour or vaginal birth, offspring delivered by CS may be adversely affected in terms of energy uptake from the gut and immune development, increasing obesity and asthma risks, respectively. This study aimed to address the evidence gap on long-term childhood outcomes following repeat CS by comparing adverse childhood health outcomes after (1) planned repeat CS and (2) unscheduled repeat CS with those that follow vaginal birth after CS (VBAC).
METHODS AND FINDINGS: A data-linkage cohort study was performed. All second-born, term, singleton offspring delivered between 1 January 1993 and 31 December 2007 in Scotland, UK, to women with a history of CS (n = 40,145) were followed up until 31 January 2015. Outcomes assessed included obesity at age 5 y, hospitalisation with asthma, learning disability, cerebral palsy, and death. Cox regression and binary logistic regression were used as appropriate to compare outcomes following planned repeat CS (n = 17,919) and unscheduled repeat CS (n = 8,847) with those following VBAC (n = 13,379). Risk of hospitalisation with asthma was greater following both unscheduled repeat CS (3.7% versus 3.3%, adjusted hazard ratio [HR] 1.18, 95% CI 1.05-1.33) and planned repeat CS (3.6% versus 3.3%, adjusted HR 1.24, 95% CI 1.09-1.42) compared with VBAC. Learning disability and death were more common following unscheduled repeat CS compared with VBAC (3.7% versus 2.3%, adjusted odds ratio 1.64, 95% CI 1.17-2.29, and 0.5% versus 0.4%, adjusted HR 1.50, 95% CI 1.00-2.25, respectively). Risk of obesity at age 5 y and risk of cerebral palsy were similar between planned repeat CS or unscheduled repeat CS and VBAC. Study limitations include the risk that women undergoing an unscheduled CS had intended to have a planned CS, and lack of data on indication for CS, which may confound the findings.

CONCLUSIONS: Birth by repeat CS, whether planned or unscheduled, was associated with an increased risk of hospitalisation with asthma but no difference in risk of obesity at age 5 y. Greater risk of death and learning disability following unscheduled repeat CS compared to VBAC may reflect complications during labour. Further research, including meta-analyses of studies of rarer outcomes (e.g., cerebral palsy), are needed to confirm whether such risks are similar between delivery groups.

Free PMC Article

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PMID: 26978456 [PubMed - indexed for MEDLINE]

Relevant Obstetric Factors for Cerebral Palsy: From the Nationwide Obstetric Compensation System in Japan.

Hasegawa J, Toyokawa S, Ikenoue T, Asano Y, Satoh S, Ikeda T, Ichizuka K, Tamiya N, Nakai A, Fujimori K, Maeda T, Masuzaki H, Suzuki H, Ueda S; Prevention Recurrence Committee, Japan Obstetric Compensation System for Cerebral Palsy.

PLoS One. 2016 Jan 28;11(1):e0148122. doi: 10.1371/journal.pone.0148122. eCollection 2016.

OBJECTIVE: The aim of this study was to identify the relevant obstetric factors for cerebral palsy (CP) after 33 weeks' gestation in Japan.
STUDY DESIGN: This retrospective case cohort study (1:100 cases and controls) used a Japanese national CP registry. Obstetric characteristics and clinical course were compared between CP cases in the Japan Obstetric Compensation System for Cerebral Palsy database and controls in the perinatal database of the Japan Society of Obstetrics and Gynecology born as live singleton infants between 2009 and 2011 with a birth weight ≥ 2,000 g and gestation ≥ 33 weeks.
RESULTS: One hundred and seventy-five CP cases and 17,475 controls were assessed. Major relevant single factors for CP were placental abnormalities (31%), umbilical cord abnormalities (15%), maternal complications (10%), and neonatal complications (1%). A multivariate regression model demonstrated that obstetric variables associated with CP were acute delivery due to non-reassuring fetal status (relative risk [RR]: 37.182, 95% confidence interval [CI]: 20.028-69.032), uterine rupture (RR: 24.770, 95% CI: 6.006-102.160), placental abruption (RR: 20.891, 95% CI: 11.817-36.934), and preterm labor (RR: 3.153, 95% CI: 2.024-4.911), whereas protective factors were head presentation (RR: 0.199, 95% CI: 0.088-0.450) and elective cesarean section (RR: 0.236, 95% CI: 0.067-0.828).
CONCLUSION: CP after 33 weeks' gestation in the recently reported cases in Japan was strongly associated with acute delivery due to non-reassuring fetal status,uterine rupture, and placental abruption.

Free PMC Article

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PMCID: PMC4731141
PMID: 26821386 [PubMed - indexed for MEDLINE]

Risk factors for periventricular white matter injury in very low birthweight neonates.

Tsimis ME, Johnson CT, Raghunathan RS, Northington FJ, Burd I, Graham EM. Hopkins University School of Medicine, Baltimore, MD.

Am J Obstet Gynecol. 2016 Mar;214(3):380.e1-6. doi: 10.1016/j.ajog.2015.09.108. Epub 2015 Nov 19.

BACKGROUND: The development of periventricular white matter injury (PWMI) in the preterm neonate is the most common insult portending neurologic impairment and is linked with the later development of cerebral palsy. The pathogenesis of PWMI targets premyelinating oligodendrocytes of the periventricular region secondary to free radicals, cytokine toxicity, and excitatory neurotransmitters. The primitive nature of the vasculature in the developing fetal cortex lends to its predilection to PWMI and cerebral ischemia with less arterial anastomoses at arterial border zones and failure to compensate for global hypotension, termed the "pressure-passive" circulation.
OBJECTIVE: Our objective is to determine the relative risk (RR) of fetal metabolic acidosis and perinatal infection in the development of PWMI in very low birthweight (VLBW) (<1500 g) neonates.
STUDY DESIGN: This is a cohort study of all VLBW neonates admitted to our neonatal intensive care unit from April 2009 through December 2014, comparing those who developed PWMI on neonatal head ultrasound at 6 weeks of life to those who did not. Neonates with chromosomal or major congenital abnormalities were excluded. Generalized linear modeling, adjusting for variables significantly different on bivariate analysis, was conducted.

RESULTS: During this 5-year and 8-month period there were 374 VLBW neonates admitted; 35 (9.4%) had PWMI. VLBW neonates without PWMI were significantly more likely to have intrauterine growth restriction (2.9% PWMI, 21.5% no PWMI; P = .006), while those neonates with PWMI had a significantly lower gestational age (26.3 ± 2.2 vs 28.0 ± 2.5 weeks; P < .001) and birthweight (868 ± 237 vs 993 ± 276 g; P = .009). There was no significant difference in umbilical arterial pH (7.25 ± 0.15 vs 7.27 ± 0.09; P = .34), base deficit (4.6 ± 6.0 vs 3.4 ± 3.3 mmol/L; P = .11), or pH <7.0 or base deficit >12 mmol/L at birth (10.7% vs 3.2%; P = .09). On bivariate analysis neonates with PWMI had a significant increase in positive cerebrospinal fluid (CSF) cultures (22.9% vs 1.5%; P < .001). The initial lumbar puncture was performed at a similar day of life, and neonates with PWMI had significantly elevated CSF white blood cell counts (5%, 50%, and 95%; 16, 175, and 709/mm(3); 1, 3, and 27/mm(3); P = .008). Generalized linear modeling, adjusted for gestational age and the presence of intrauterine growth restriction, showed that fetal metabolic acidosis had RR 2.59 (95% confidence interval, 1.14-5.92; P = .02) and neonatal CSF infection had RR 4.94 (95% confidence interval, 2.4-10.3; P < .001) for association with PWMI.
CONCLUSION: The RR of neonatal CSF infection being associated with PWMI was 2-fold greater than metabolic acidosis at the time of birth. Decreasing the incidence of CSF infections would have a greater impact on preventing PWMI, a precursor of cerebral palsy.

DOI: 10.1016/j.ajog.2015.09.108
PMID: 26454132 [PubMed - indexed for MEDLINE]

Significance of oligohydramnios in preterm small-for-gestational-age infants for outcome at 18 months of age.
Sasahara J, Ishii K, Umehara N, Oba M, Kiyoshi K, Murakoshi T, Tanemoto T, Ishikawa H, Ichizuka K, Yoshida A, Tanaka K, Ozawa K, Sago H
J Obstet Gynaecol Res. 2016 Jun 29. doi: 10.1111/jog.13074. [Epub ahead of print]

AIM: The aim of this study was to evaluate the association between oligohydramnios and other perinatal factors in preterm small-for-gestational-age (SGA) infants who had cerebral palsy at 18 months of age or who had died before this age.
METHODS: This retrospective study included 320 infants with birthweights < 3rd percentile delivered between 22 and 33 complete weeks of gestation. We evaluated the incidence of CP at 18 months of age and of death before this age. The significant risk factors, including oligohydramnios, of CP or death of preterm SGA infants were evaluated by logistic regression analysis.
RESULTS: The incidence of CP or death was 47/320 (14.7%), consisting of 24/320 (7.5%) cases of CP and 23/320 (7.2%) cases of death. Oligohydramnios (adjusted odds ratio, 2.18; 95% confidence interval, 1.07-4.45) and gestational age (adjusted odds ratio, 0.76; 95% confidence interval, 0.66-0.87) were independently correlated with outcome.
CONCLUSION: The incidence of adverse outcomes was approximately 15% in preterm SGA infants. SGA infants born with oligohydramnios may be at increased risk for CP or death compared to those with normal amniotic volume.

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PMID: 27352940 [PubMed - as supplied by publisher]

Lésions - Prévention des lesions

Données fondamentales

AMPA-Kainate Receptor Inhibition Promotes Neurologic Recovery in Premature Rabbits with Intraventricular Hemorrhage.
Dohare P, Zia MT, Ahmed E, Ahmed A, Yadala V, Schober AL, Ortega JA, Kayton R, Ungvari Z, Mongin AA, Ballabh P
J Neurosci. 2016 Mar 16;36(11):3363-77. doi: 10.1523/JNEUROSCI.4329-15.2016.

Intraventricular hemorrhage (IVH) in preterm infants leads to cerebral inflammation, reduced myelination of the white matter, and neurological deficits. No therapeutic strategy exists against the IVH-induced white matter injury.AMPA-kainate receptor induced excitotoxicity contributes to oligodendrocyte precursor cell (OPC) damage

and hypomyelination in both neonatal and adult models of brain injury. Here, we hypothesized that IVH damages white matter via AMPA receptor activation, and that AMPA-kainate receptor inhibition suppresses inflammation and restores OPC maturation, myelination, and neurologic recovery in preterm newborns with IVH. We tested these hypotheses in a rabbit model of glycerol-induced IVH and evaluated the expression of AMPA receptors in autopsy samples from human preterm infants. GluR1-GluR4 expressions were comparable between preterm humans and rabbits with and without IVH. However, GluR1 and GluR2 levels were significantly lower in the embryonic white matter and germinal matrix relative to the neocortex in both infants with and without IVH. Pharmacological blockade of AMPA-kainate receptors with systemic NBQX, or selective AMPA receptor inhibition by intramuscular perampanel restored myelination and neurologic recovery in rabbits with IVH. NBQX administration also reduced the population of apoptotic OPCs, levels of several cytokines (TNFα, IL-β, IL-6, LIF), and the density of Iba1(+) microglia in pups with IVH. Additionally, NBQX treatment inhibited STAT-3 phosphorylation, but not astrogliosis or transcription factors regulating gliosis. Our data suggest that AMPA-kainate receptor inhibition alleviates OPC loss and IVH-induced inflammation and restores myelination and neurologic recovery in preterm rabbits with IVH. Therapeutic use of FDA-approved perampanel treatment might enhance neurologic outcome in premature infants with IVH.SIGNIFICANCE STATEMENT: Intraventricular hemorrhage (IVH) is a major complication of prematurity and a large number of survivors with IVH develop cerebral palsy and cognitive deficits. The development of IVH leads to inflammation of the periventricular white matter, apoptosis and arrested maturation of oligodendrocyte precursor cells, and hypomyelination. Here, we show that AMPA-kainate receptor inhibition by NBQX suppresses inflammation, attenuates apoptosis of oligodendrocyte precursor cells, and promotes myelination as well as clinical recovery in preterm rabbits with IVH. Importantly, AMPA-specific inhibition by the FDA-approved perampanel, which unlike NBQX has a low side-effect profile, also enhances myelination and neurological recovery in rabbits with IVH. Hence, the present study highlights the role of AMPA-kainate receptor in IVH-induced white matter injury and identifies a novel strategy of neuroprotection, which might improve the neurological outcome for premature infants with IVH.

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PMCID: PMC4792944 [Available on 2016-09-16]
PMID: 26985043 [PubMed - indexed for MEDLINE]

Automated, quantitative measures of grey and white matter lesion burden correlates with motor and cognitive function in children with unilateral cerebral palsy.

Pagnozzi AM, Dowson N, Doecke J, Fiori S, Bradley AP, Boyd RN, Rose S

Neuroimage Clin. 2016 May 29;11:751-9. doi: 10.1016/j.nicl.2016.05.018. eCollection 2016.

White and grey matter lesions are the most prevalent type of injury observable in the Magnetic Resonance Images (MRIs) of children with cerebral palsy (CP). Previous studies investigating the impact of lesions in children with CP have been qualitative, limited by the lack of automated segmentation approaches in this setting. As a result, the quantitative relationship between lesion burden has yet to be established. In this study, we perform automatic lesion segmentation on a large cohort of data (107 children with unilateral CP and 18 healthy children) with a new, validated method for segmenting both white matter (WM) and grey matter (GM) lesions. The method has better accuracy (94%) than the best current methods (73%), and only requires standard structural MRI sequences. Anatomical lesion burdens most predictive of clinical scores of motor, cognitive, visual and communicative function were identified using the Least Absolute Shrinkage and Selection operator (LASSO). The improved segmentations enabled identification of significant correlations between regional lesion burden and clinical performance, which conform to known structure-function relationships. Model performance was validated in an independent test set, with significant correlations observed for both WM and GM regional lesion burden with motor function ($p < 0.008$), and between WM and GM lesions alone with cognitive and visual function respectively ($p < 0.008$). The significant correlation of GM lesions with functional outcome highlights the serious implications GM lesions, in addition to WM lesions, have for prognosis, and the utility of structural MRI alone for quantifying lesion burden and planning therapy interventions.

Free PMC Article

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PMCID: PMC4908311

PMID: 27330975 [PubMed - in process]

Chronic fetal hypoxia affects axonal maturation in guinea pigs during development: A longitudinal diffusion tensor imaging and T2 mapping study.

Kim J, Choi IY, Dong Y, Wang WT, Brooks WM, Weiner CP, Lee P

J Magn Reson Imaging. 2015 Sep;42(3):658-65. doi: 10.1002/jmri.24825. Epub 2014Dec 15.

PURPOSE: To investigate the impact of chronic hypoxia on neonatal brains, and follow developmental alterations and adaptations noninvasively in a guinea pig model. Chronic hypoxemia is the prime cause of fetal brain injury and long-term sequelae such as neurodevelopmental compromise, seizures, and cerebral palsy.

MATERIALS AND METHODS: Thirty guinea pigs underwent either normoxic and hypoxemic conditions during the critical stage of brain development (0.7 gestation) and studied prenatally (n = 16) or perinatally (n = 14). Fourteen newborns (7 hypoxia and 7 normoxia group) were scanned longitudinally to characterize physiological and morphological alterations, and axonal myelination and injury using in vivo diffusion tensor imaging (DTI), T2 mapping, and T2 -weighted magnetic resonance imaging (MRI). Sixteen fetuses (8 hypoxia and 8 normoxia) were studied ex vivo to assess hypoxia-induced neuronal injury/loss using Nissl staining and quantitative reverse transcriptase polymerase chain reaction methods.

RESULTS: Developmental brains in the hypoxia group showed lower fractional anisotropy in the corpus callosum (-12%, P = 0.02) and lower T2 values in the hippocampus (-16%, P = 0.003) compared with the normoxia group with no differences in the cortex (P > 0.07), indicating vulnerability of the hippocampus and cerebral white matter during early development. Fetal guinea pig brains with chronic hypoxia demonstrated an over 10-fold increase in expression levels of hypoxia index genes such as erythropoietin and HIF-1α, and an over 40% reduction in neuronal density, confirming prenatal brain damage.

CONCLUSION: In vivo MRI measurement, such as DTI and T2 mapping, provides quantitative parameters to characterize neurodevelopmental abnormalities and to monitor the impact of prenatal insult on the postnatal brain maturation of guinea pigs.

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PMCID: PMC4468050 [Available on 2016-09-01]
PMID: 25504885 [PubMed - indexed for MEDLINE]

Delayed post-treatment with bone marrow-derived mesenchymal stem cells is neurorestorative of striatal medium-spiny projection neurons and improves motor function after neonatal rat hypoxia-ischemia.

Cameron SH, Alwakeel AJ, Goddard L, Hobbs CE, Gowing EK, Barnett ER, Kohe SE, Sizemore RJ, Oorschot DE

Mol Cell Neurosci. 2015 Sep;68:56-72. doi: 10.1016/j.mcn.2015.03.019. Epub 2015Mar 28.

Perinatal hypoxia-ischemia is a major cause of striatal injury and may lead to cerebral palsy. This study investigated whether delayed administration of bone marrow-derived mesenchymal stem cells (MSCs), at one week after neonatal rat hypoxia-ischemia, was neurorestorative of striatal medium-spiny projection neurons and improved motor function. The effect of a subcutaneous injection of a high-dose, or a low-dose, of MSCs was investigated in stereological studies. Postnatal day (PN) 7 pups were subjected to hypoxia-ischemia. At PN14, pups received treatment with either MSCs or diluent. A subset of high-dose pups, and their diluent control pups, were also injected intraperitoneally with bromodeoxyuridine (BrdU), every 24h, on PN15, PN16 and PN17. This permitted tracking of the migration and survival of neuroblasts originating from the subventricular zone into the adjacent injured striatum. Pups were euthanized on PN21 and the absolute number of striatal medium-spiny projection neurons was measured after immunostaining for DARPP-32 (dopamine- and cAMP-regulated phosphoprotein-32), double immunostaining for BrdU and DARPP-32, and after cresyl violet staining alone. The absolute number of striatal immunostained calretinin interneurons was also measured. There was a statistically significant increase in the absolute number of DARPP-32-positive, BrdU/DARPP-32-positive, and cresyl violet-stained striatal medium-spiny projection neurons, and fewer striatal calretinin interneurons, in the high-dose mesenchymal stem cell (MSC) group compared to their diluent counterparts. A high-dose of MSCs restored the absolute number of these neurons to normal uninjured levels, when compared with previous stereological data on the absolute number of cresyl violet-stained striatal medium-spiny projection neurons in the normal uninjured brain. For the low-dose experiment, in which cresyl violet-stained striatal medium-spiny neurons alone were measured, there was a lower statistically significant increase in

their absolute number in the MSC group compared to their diluent controls. Investigation of behavior in another cohort of animals showed that delayed administration of a high-dose of bone marrow-derived MSCs, at one week after neonatal rat hypoxia-ischemia, improved motor function on the cylinder test. Thus, delayed therapy with a high- or low-dose of adult MSCs, at one week after injury, is effective in restoring the loss of striatal medium-spiny projection neurons after neonatal rat hypoxia-ischemia and a high-dose of MSCs improved motor function.

DOI: 10.1016/j.mcn.2015.03.019
PMID: 25828540 [PubMed - indexed for MEDLINE]

Maternal inflammation leads to impaired glutamate homeostasis and up-regulation of glutamate carboxypeptidase II in activated microglia in the fetal/newborn rabbit brain.
Zhang Z, Bassam B, Thomas AG, Williams M, Liu J, Nance E, Rojas C, Slusher BS, Kannan S
Neurobiol Dis. 2016 Jun 17;94:116-128. doi: 10.1016/j.nbd.2016.06.010. [Epub ahead of print]

Astrocyte dysfunction and excessive activation of glutamatergic systems have beenn implicated in a number of neurologic disorders, including periventricular leukomalacia (PVL) and cerebral palsy (CP). However, the role of chorioamnionitis on glutamate homeostasis in the fetal and neonatal brains is not clearly understood. We have previously shown that intrauterine endotoxin administration results in intense microglial 'activation' and increased pro-inflammatory cytokines in the periventricular region (PVR) of the neonatal rabbit brain. In this study, we assessed the effect of maternal inflammation on key components of the glutamate pathway and its relationship to astrocyte and microglial activation in the fetal and neonatal New Zealand white rabbit brain. We found that intrauterine endotoxin exposure at gestational day 28 (G28) induced acute and prolonged glutamate elevation in the PVR of fetal (G29, 1day post-injury) and postnatal day 1 (PND1, 3days post-injury) brains along with prominent morphological changes in the astrocytes (soma hypertrophy and retracted processes) in the white matter tracts. There was a significant increase in glutaminase and N-Methyl-d-Aspartate receptor (NMDAR) NR2 subunit expression along with decreased glial L-glutamate transporter 1 (GLT-1) in the PVR at G29, that would promote acute dysregulation of glutamate homeostasis. This was accompanied with significantly decreased TGF-β1 at PND1 in CP kits indicating ongoing neuroinflammation. We also show for the first time that glutamate carboxypeptidase II (GCPII) was significantly increased in the activated microglia at the periventricular white matter area in both G29 and PND1 CP kits. This was confirmed by in vitro studies demonstrating that LPS activated primary microglia markedly upregulate GCPII enzymatic activity. These results suggest that maternal intrauterine endotoxin exposure results in early onset and long-lasting dysregulation of glutamate homeostasis, which may be mediated by impaired astrocyte function and GCPII upregulation in activated microglia.

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PMID: 27326668 [PubMed - as supplied by publisher]

Structural connectivity of the anterior cingulate in children with unilateral cerebral palsy due to white matter lesions.
Scheck SM, Pannek K, Raffelt DA, Fiori S, Boyd RN, Rose SE
Neuroimage Clin. 2015 Sep 30;9:498-505. doi: 10.1016/j.nicl.2015.09.014. eCollection 2015.

In this work we investigate the structural connectivity of the anterior cingulate cortex (ACC) and its link with impaired executive function in children with unilateral cerebral palsy (UCP) due to periventricular white matter lesions. Fifty two children with UCP and 17 children with typical development participated in the study, and underwent diffusion and structural MRI. Five brain regions were identified for their high connectivity with the ACC using diffusion MRI fibre tractography: the superior frontal gyrus, medial orbitofrontal cortex, rostral middle frontal gyrus, precuneus and isthmus cingulate. Structural connectivity was assessed in pathways connecting these regions to the ACC using three diffusion MRI derived measures: fractional anisotropy (FA), mean diffusivity (MD) and apparent fibre density (AFD), and compared between participant groups. Furthermore we investigated correlations of these measures with executive function as assessed by the Flanker task. The ACC-precuneus tract had significantly different MD ($p < 0.0001$) and AFD ($p = 0.0072$) between groups, with post-hoc analysis showing significantly increased MD in the right hemisphere of children with left hemiparesis compared with controls. The ACC-superior frontal gyrus tract had significantly different FA ($p = 0.0049$) and MD ($p = 0.0031$) between groups. AFD in this tract

(contralateral to side of hemiparesis; right hemisphere in controls) showed a significant relationship with Flanker task performance ($p = 0.0045$, $\beta = -0.5856$), suggesting that reduced connectivity correlates with executive dysfunction. Reduced structural integrity of ACC tracts appears to be important in UCP, in particular the connection to the superior frontal gyrus. Although damage to this area is heterogeneous it may be important in early identification of children with impaired executive function.
DOI: 10.1016/j.nicl.2015.09.014
PMCID: PMC4610959
PMID: 26640762 [PubMed - indexed for MEDLINE]

Surface functionality affects the biodistribution and microglia-targeting of intra-amniotically delivered dendrimers.

Zhang F, Nance E, Zhang Z, Jasty V, Kambhampati SP, Mishra MK, Burd I, Romero R, Kannan S, Kannan RM
J Control Release. 2016 Jul 1;237:61-70. doi: 10.1016/j.jconrel.2016.06.046.[Epub ahead of print]

Cerebral Palsy (CP) is a chronic childhood disorder with limited therapeutic options. Maternal intrauterine inflammation/infection is a major risk factor in the pathogenesis of CP. In pre-clinical models, dendrimer-based therapies are viable in postnatal period, attenuating inflammation and improving motor function in vivo. However, treatment to the mother, in the prenatal period, may provide the possibility of preventing/resolving inflammation at early stages. Towards this goal, we used a maternal intrauterine inflammation-induced rabbit model of CP to study fetal-maternal transport and neuroinflammation targeting of intra-amniotically administrated dendrimers with neutral/anionic surface functionality. Our study suggested both hydroxyl-terminated 'neutral' (D-OH) and carboxyl-terminated 'anionic' (D-COOH) Polyamidoamine (PAMAM) dendrimers were absorbed by fetuses and demonstrated bi-directional transport between fetuses and mother. D-OH was more effective in crossing the fetal blood-brain barrier, and targeting activated microglia. The cell-specific targeting was associated with the extent of microglia activation. This study demonstrated intra-amniotically administered hydroxyl PAMAM dendrimers could be an effective drug delivery vehicle for targeting fetal inflammation and preventing subsequent neurologic injury associated with chorioamnionitis.

DOI: 10.1016/j.jconrel.2016.06.046
PMID: 27378700 [PubMed - as supplied by publisher]

Upregulation of cystathione β-synthase and p70S6K/S6 in neonatal hypoxic ischemic brain injury.

Lechpammer M, Tran YP, Wintermark P, Martínez-Cerdeño V, Krishnan VV, Ahmed W, Berman RF, Jensen FE, Nudler E, Zagzag D
Brain Pathol. 2016 Jul 28. doi: 10.1111/bpa.12421. [Epub ahead of print]

Encephalopathy of prematurity (EOP) is a complex form of cerebral injury that occurs in the setting of hypoxia-ischemia (HI) in premature infants. Using a rat model of EOP, we investigated whether neonatal HI of the brain may alter the expression of cystathionine β-synthase (CBS) and the components of the mammalian target of rapamycin (mTOR) signaling. We performed unilateral carotid ligation and induced HI (UCL/HI) in Long-Evans rats at P6 and found increased CBS expression in white matter (i.e., corpus callosum, cingulum bundle and external capsule) as early as 24 hours (P7) post-procedure. CBS remained elevated through P21, and, to a lesser extent, at P40. The mTOR downstream target 70 kDa ribosomal protein S6 kinase (p70S6K and phospho-p70S6K) and 40S ribosomal protein S6 (S6 and phospho-S6) were also overexpressed at the same time points in the UCL/HI rats compared to healthy controls. Overexpression of mTOR components was not observed in rats treated with the mTOR inhibitor everolimus. Behavioral assays performed on young rats (postnatal day 35-37) following UCL/HI at P6 indicated impaired preference for social novelty, a behavior relevant to autism spectrum disorder, and hyperactivity. Everolimus restored behavioral patterns to those observed in healthy controls. A gait analysis has shown that motor deficits in the hind paws of UCL/HI rats were also significantly reduced by everolimus. Our results suggest that neonatal HI brain injury may inflict long-term damage by upregulation of CBS and mTOR signaling. We propose this cascade as a possible new molecular target for EOP - a still untreatable cause of autism, hyperactivity and cerebral palsy. This article is protected by copyright. All rights reserved.

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PMID: 27465493 [PubMed - as supplied by publisher]

Données cliniques

aEEG monitoring analysis of lesion degree and long-term prognosis in newborns with HIE.
Liu JF, Wu HW, Li ZG, Lu GZ, Yang X.
Eur Rev Med Pharmacol Sci. 2016 Jul;20(13):2863-7.

OBJECTIVE: To conduct monitoring analysis of lesion degree and long-term prognosis using ambulatory electroencephalography (aEEG) in newborns with hypoxic-ischemic encephalopathy (HIE).
PATIENTS AND METHODS: 48 cases of newborns with HIE (aged 37 to 41 weeks) as the observation group and another 50 cases of full-term infants with non-traumatic brain illness as the control group were chosen from March 2012 to March 2013. The aEEG were observed, and the continuity and sleep-wake cycle (SWC) between the two groups were compared. The relevance of aEEG monitoring results and HIE, as well as the long-term prognosis, were analyzed.
RESULTS: 33.33% (16/48) of EEG results appeared to be continuous and 20.83% (10/48) of the SWC results were mature for observation group. These EEG and SWC results are conspicuously lower than the control group 100% (50/50) and differences were statistically significant ($p<0.05$). The maximum voltage of observation group was 56.54±19.33 LV, notably higher than the control group (37.77±2. 79 LV). The minimum voltage of the observation group was 4.26±1.25 LV, markedly lower than the control group (7.75±0.67 LV) and these differences were statistically significant ($p<0.05$). Correlational analysis based on the Spearman approach showed that the monitoring results are positively correlated with clinical classification of HIE. After six months of follow-up, 11 of the 48 cases (22.92%) were found to be disabled (including mental retardation and cerebral palsy).
CONCLUSIONS: aEEG enjoys easy operation, effective diagnosis, supports continuous monitoring and reflects the lesion degree as well as long-term prognosis of newborns with HIE and is, thus, highly recommended in clinical practices.
Free Article
PMID: 27424986 [PubMed - in process]

Disparity in post-treatment maternal circulating magnesium sulfate levels between twin and singleton gestation: Is this the missing link between plurality andadverse outcome?
Marom-Haham L, Mazaki-Tovi S, Zilberman I, Kalter A, Haas J, Sivan E, Schiff E, Yinon Y.
J Perinat Med. 2015 Sep;43(5):585-90. doi: 10.1515/jpm-2014-0158.

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.
DOI: 10.1515/jpm-2014-0158
PMID: 25222591 [PubMed - indexed for MEDLINE]

Effects of permissive hypercapnia on pulmonary and neurodevelopmental sequelae in extremely low birth weight infants: a meta-analysis.

Ma J, Ye H

Springerplus. 2016 Jun 17;5(1):764. doi: 10.1186/s40064-016-2437-5. eCollection 2016.

OBJECTIVES: To perform a systematic review and meta-analysis of the efficacy and safety of permissive hypercapnia in extremely low birth weight infants.

METHODS: A systematic search of MEDLINE, EMBASE, the Cochrane Database of randomized trials. Eligibility and quality of trials were assessed, and data on study design, patient characteristics, and relevant outcomes were extracted.

RESULTS: Four studies that enrolled a total of 693 participants were selected. Meta-analysis revealed no effect of permissive hypercapnia on decreasing rates of bronchopulmonary dysplasia (BPD). Permissive hypercapnia also had no significant effect on mortality, intraventricular haemorrhage (IVH), IVH (grade 3-4), periventricular leukomalacia (PVL), necrotising enterocolitis (NEC), retinopathy of prematurity (ROP) or air leaks in extremely low birth weight infants. Neurodevelopmental outcomes were comparable at 18-22 months' corrected age in two studies. permissive hypercapnia did not increase the risk of cerebral palsy, Mental Developmental Index <70, Psychomotor Developmental Index <70, visual deficit, or hearing deficit.

CONCLUSIONS: Permissive hypercapnia did not reduce the rate of BPD in extremely low birth weight infants. The rates of mortality, IVH, PVL, NEC, ROP and neurodevelopmental outcomes did not differ between these two groups. These results suggest that permissive hypercapnia does not bring extra benefits in extremely low birth weight infants.

http://www.ncbi.nlm.nih.gov/pmc/articles/pmid/27386250/

DOI: 10.1186/s40064-016-2437-5

PMCID: PMC4912505

PMID: 27386250 [PubMed]

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Melatonin for women in pregnancy for neuroprotection of the fetus.

Wilkinson D, Shepherd E, Wallace EM.

Cochrane Database Syst Rev. 2016 Mar 29;3:CD010527. doi: 10.1002/14651858.CD010527.pub2

BACKGROUND: Melatonin is an antioxidant with anti-inflammatory and anti-apoptotic effects. Animal studies have supported a fetal neuroprotective role for melatonin when administered maternally. It is important to assess whether melatonin, given to the mother, can reduce the risk of neurosensory disabilities (including cerebral palsy) and death, associated with fetal brain injury, for the preterm or term compromised fetus.

OBJECTIVES: To assess the effects of melatonin when used for neuroprotection of the fetus.

SEARCH METHODS: We searched the Cochrane Pregnancy and Childbirth Group's Trials Register (31 January 2016).

SELECTION CRITERIA: We planned to include randomised controlled trials and quasi-randomised controlled trials comparing melatonin given to women in pregnancy (regardless of the route, timing, dose and duration of administration) for fetal neuroprotection with placebo, no treatment, or with an alternative agent aimed at providing fetal neuroprotection. We also planned to include comparisons of different regimens for administration of melatonin.

DATA COLLECTION AND ANALYSIS: Two review authors planned to independently assess trial eligibility, trial quality and extract the data.

MAIN RESULTS: We found no randomised trials for inclusion in this review. One study is ongoing.

AUTHORS' CONCLUSIONS: As we did not identify any randomised trials for inclusion in this review, we are unable to comment on implications for practice at this stage.Although evidence from animals studies has supported a fetal neuroprotective role for melatonin when administered to the mother during pregnancy, no trials assessing melatonin for fetal neuroprotection in pregnant women have been completed to date. However, there is currently one ongoing randomised controlled trial (with an estimated enrolment target of 60 pregnant women) which examines the dose of melatonin, administered to women at risk of imminent very preterm birth (less than 28 weeks' gestation) required to reduce brain damage in the white matter of the babies that were born very preterm.Further high-quality research is needed and research efforts should directed towards trials comparing melatonin with either no intervention (no treatment or placebo), or with alternative agents aimed at providing fetal neuroprotection (such

as magnesium sulphate for the very preterm infant). Such trials should evaluate maternal and infant short- and longer-term outcomes (including neurosensory disabilities such as cerebral palsy), and consider the costs of care.
DOI: 10.1002/14651858.CD010527.pub2
PMID: 27022888 [PubMed - indexed for MEDLINE]

[State of the use of magnesium sulfate for prevention of cerebral palsy in pre-term newborn in the Rouen's hospital].

[Article in French]

Millochau JC, Marret S, Oden S, Verspyck E

Gynecol Obstet Fertil. 2016 Jul 14. pii: S1297-9589(16)30157-6. doi: 10.1016/j.gyobfe.2016.05.008. [Epub ahead of print]

OBJECTIVES: Although the benefit of magnesium sulfate to prevent cerebral palsy in antenatal on very preterm infants has been shown, there is still reluctance to use it. The aim of this study was to conduct an assessment of our practice using magnesium sulfate to prevent cerebral palsy at Rouen University Hospital to report its feasibility and safety in order to spread its use.
METHODS: Unicentric and retrospective study, at the University Hospital of Rouen, between January and June 2014. All patients who delivered before 33 weeks or considered at risk of imminent delivery before 33 weeks were included (n=86).
RESULTS: Among the patients who delivered before 33 weeks (n=82), a magnesium sulfate loading dose was administrated in 91.5% of cases. Treatment was mainly established and monitored by midwives (98.6%), usually in the delivery room (82.4%), and with an average duration of administration of 8.9±17.5hours. The treatment had to be stopped in a patient who presented bradypnea associated with impaired consciousness.
CONCLUSION: Our study shows that magnesium sulfate can easily be prescribed in clinical practice.

DOI: 10.1016/j.gyobfe.2016.05.008
PMID: 27426688 [PubMed - as supplied by publisher]

Regional vulnerability of longitudinal cortical association connectivity: Associated with structural network topology alterations in preterm children with cerebral palsy.

Ceschin R, Lee VK, Schmithorst V, Panigrahy A

Neuroimage Clin. 2015 Sep 6;9:322-37. doi: 10.1016/j.nicl.2015.08.021. eCollection 2015.

Preterm born children with spastic diplegia type of cerebral palsy and white matter injury or periventricular leukomalacia (PVL), are known to have motor, visual and cognitive impairments. Most diffusion tensor imaging (DTI) studies performed in this group have demonstrated widespread abnormalities using averaged deterministic tractography and voxel-based DTI measurements. Little is known about structural network correlates of white matter topography and reorganization in preterm cerebral palsy, despite the availability of new therapies and the need for brain imaging biomarkers. Here, we combined novel post-processing methodology of probabilistic tractography data in this preterm cohort to improve spatial and regional delineation of longitudinal cortical association tract abnormalities using an along-tract approach, and compared these data to structural DTI cortical network topology analysis. DTI images were acquired on 16 preterm children with cerebral palsy (mean age 5.6 ± 4) and 75 healthy controls (mean age 5.7 ± 3.4). Despite mean tract analysis, Tract-Based Spatial Statistics (TBSS) and voxel-based morphometry (VBM) demonstrating diffusely reduced fractional anisotropy (FA) reduction in all white matter tracts, the along-tract analysis improved the detection of regional tract vulnerability. The along-tract map-structural network topology correlates revealed two associations: (1) reduced regional posterior-anterior gradient in FA of the longitudinal visual cortical association tracts (inferior fronto-occipital fasciculus, inferior longitudinal fasciculus, optic radiation, posterior thalamic radiation) correlated with reduced posterior-anterior gradient of intra-regional (nodal efficiency) metrics with relative sparing of frontal and temporal regions; and (2) reduced regional FA within frontal-thalamic-striatal white matter pathways (anterior limb/anterior thalamic radiation, superior longitudinal fasciculus and cortical spinal tract) correlated with alteration in eigenvector centrality, clustering coefficient (inter-regional) and participation co-efficient (inter-modular) alterations of frontal-striatal and fronto-limbic nodes suggesting re-organization of these pathways. Both along tract and structural topology network measurements correlated strongly with motor and visual clinical outcome scores. This study shows the value of

combining along-tract analysis and structural network topology in depicting not only selective parietal occipital regional vulnerability but also reorganization of frontal-striatal and frontal-limbic pathways in preterm children with cerebral palsy. These finding also support the concept that widespread, but selective posterior-anterior neural network connectivity alterations in preterm children with cerebral palsy likely contribute to the pathogenesis of neurosensory and cognitive impairment in this group.
DOI: 10.1016/j.nicl.2015.08.021
PMCID: PMC4588423
PMID: 26509119 [PubMed - indexed for MEDLINE]

Using diffusion tensor imaging to identify corticospinal tract projection patterns in children with unilateral spastic cerebral palsy.
Kuo HC, Ferre CL, Carmel JB, Gowatsky JL, Stanford AD, Rowny SB, Lisanby SH, Gordon AM, Friel KM
Dev Med Child Neurol. 2016 Jul 27. doi: 10.1111/dmcn.13192. [Epub ahead of print]

AIM: To determine whether diffusion tensor imaging (DTI) can be an independent assessment for identifying the corticospinal tract (CST) projecting from the more-affected motor cortex in children with unilateral spastic cerebral palsy (CP).
METHOD: Twenty children with unilateral spastic CP participated in this study (16 males, four females; mean age 9y 2mo [standard deviation (SD) 3y 2mo], Manual Ability Classification System [MACS] level I-III). We used DTI tractography to reconstruct the CST projecting from the more-affected motor cortex. We mapped the motor representation of the more-affected hand by stimulating the more- and the less-affected motor cortex measured with single-pulse transcranial magnetic stimulation (TMS). We then verified the presence or absence of the contralateral CST by comparing the TMS map and DTI tractography. Fisher's exact test was used to determine the association between findings of TMS and DTI.
RESULTS: DTI tractography successfully identified the CST controlling the more-affected hand (sensitivity=82%, specificity=78%).
INTERPRETATION: Contralateral CST projecting from the lesioned motor cortex assessed by DTI is consistent with findings of TMS mapping. Since CST connectivity may be predictive of response to certain upper extremity treatments, DTI-identified CST connectivity may potentially be valuable for determining such connectivity where TMS is unavailable or inadvisable for children with seizures.

DOI: 10.1111/dmcn.13192
PMID: 27465858 [PubMed - as supplied by publisher]

Dectection – Diagnostic

Données cliniques

A plea for developmental motor screening in Canadian infants.
Harris SR
Paediatr Child Health. 2016 Apr;21(3):129-30.Comment on Paediatr Child Health. 2011 Dec;16(10):647-54.

Motor delays during infancy may be the first observable sign of a specific neurodevelopmental disability or of more global developmental delays. The earlier such disorders are identified, the sooner these infants can be referred for early intervention services. Although developmental motor screening is strongly recommended in other Western countries, Canada has yet to provide a developmental surveillance and screening program. Ideally, screening for motor disabilities should occur as part of the 12-month well-baby visit. In advance of that visit, parents can be provided with a parent-screening questionnaire that they can complete and bring with them to their 12-month office visit. Interpretation of the parent-completed questionnaire takes only 2 min to 3 min of the health care professional's time and, based on the results, can either reassure parents that their infant is developing typically, or lead to a referral for standardized motor screening or assessment by a paediatric physical or occupational therapist.
Publisher: Abstract available from the publisher.

PMCID: PMC4933070 [Available on 2016-10-01]
PMID: 27396842 [PubMed]

Assessment of general movements and heart rate variability in prediction of neurodevelopmental outcome in preterm infants.
Dimitrijević L, Bjelaković B, Čolović H, Mikov A, Živković V, Kocić M, Lukić S
Early Hum Dev. 2016 Aug;99:7-12. doi: 10.1016/j.earlhumdev.2016.05.014. Epub 2016 Jun 30.

BACKGROUND: Adverse neurologic outcome in preterm infants could be associated with abnormal heart rate (HR) characteristics as well as with abnormal general movements (GMs) in the 1st month of life.
AIMS: To demonstrate to what extent GMs assessment can predict neurological outcome in preterm infants in our clinical setting; and to assess the clinical usefulness of time-domain indices of heart rate variability (HRV) in improving predictive value of poor repertoire (PR) GMs in writhing period.
STUDY DESIGN: Qualitative assessment of GMs at 1 and 3 months corrected age; 24h electrocardiography (ECG) recordings and analyzing HRV at 1 month corrected age.
SUBJECTS: Seventy nine premature infants at risk of neurodevelopmental impairments were included prospectively.
OUTCOME MEASURES: Neurodevelopmental outcome was assessed at the age of 2 years corrected. Children were classified as having normal neurodevelopmental status, minor neurologic dysfunction (MND), or cerebral palsy (CP).
RESULTS: We found that GMs in writhing period (1 month corrected age) predicted CP at 2 years with sensitivity of 100%, and specificity of 72.1%. Our results demonstrated the excellent predictive value of cramped synchronized (CS) GMs, but not of PR pattern. Analyzing separately a group of infants with PR GMs we found significantly lower values of HRV parameters in infants who later developed CP or MND vs. infants with PR GMs who had normal outcome.
CONCLUSIONS: The quality of GMs was predictive for neurodevelopmental outcome at 2 years. Prediction of PR GMs was significantly enhanced with analyzing HRV parameters.

DOI: 10.1016/j.earlhumdev.2016.05.014

Automatic segmentation approach to extracting neonatal cerebral ventricles from 3D ultrasound images.
Qiu W, Chen Y, Kishimoto J, de Ribaupierre S, Chiu B, Fenster A, Yuan J
Med Image Anal. 2016 Jul 9;35:181-191. doi: 10.1016/j.media.2016.06.038. [Epub ahead of print]

Preterm neonates with a very low birth weight of less than 1,500 g are at increased risk for developing intraventricular hemorrhage (IVH). Progressive ventricle dilatation of IVH patients may cause increased intracranial pressure, leading to neurological damage, such as neurodevelopmental delay and cerebral palsy. The technique of 3D ultrasound (US) imaging has been used to quantitatively monitor the ventricular volume in IVH neonates, which may elucidate the ambiguity surrounding the timing of interventions in these patients as 2D clinical US imaging relies on linear measurement and visual estimation of ventricular dilation from a series of 2D slices. To translate 3D US imaging into the clinical setting, a fully automated segmentation algorithm is necessary to extract the ventricular system from 3D neonatal brain US images. In this paper, an automatic segmentation approach is proposed to delineate lateral ventricles of preterm neonates from 3D US images. The proposed segmentation approach makes use of phase congruency map, multi-atlas initialization technique, atlas selection strategy, and a multiphase geodesic level-sets (MGLS) evolution combined with a spatial shape prior derived from multiple pre-segmented atlases. Experimental results using 30 IVH patient images show that the proposed GPU-implemented approach is accurate in terms of the Dice similarity coefficient (DSC), the mean absolute surface distance (MAD), and maximum absolute surface distance (MAXD). To the best of our knowledge, this paper reports the first study on automatic segmentation of the ventricular system of premature neonatal brains from 3D US images.

DOI: 10.1016/j.media.2016.06.038
PMID: 27428629 [PubMed - as supplied by publisher

Slow pupillary light responses in infants at high risk of cerebral palsy were associated with periventricular leukomalacia and neurological outcome.
Hamer EG, Vermeulen JR, Dijkstra LJ, Hielkema T, Kos C, Bos AF, Hadders-Algra M

Acta Paediatr. 2016 Jul 28. doi: 10.1111/apa.13532. [Epub ahead of print]

AIM: Having observed slow pupillary light responses (PLR) in infants at high risk of cerebral palsy, we retrospectively evaluated whether these were associated with specific brain lesions or unfavourable outcomes.
METHODS: We carried out neurological examinations on 30 infants at very high risk of cerebral palsy five times until the corrected age of 21 months, classifying each PLR assessment as normal or slow. The predominant reaction during development was determined for each infant. Neonatal brain scans were classified based on the type of brain lesion. Developmental outcome was evaluated at 21 months of corrected age with a neurological examination, the Bayley Scales of Infant Development Second Edition and the Infant Motor Profile.
RESULTS: Of the 30 infants, 16 developed cerebral palsy. Predominantly slow PLR were observed in eight infants and were associated with periventricular leukomalacia (p=0.007), cerebral palsy (p=0.039), bilateral cerebral palsy (p=0.001), poorer quality of motor behaviour (p<0.0005) and poorer cognitive outcome (p=0.045).
CONCLUSION: This explorative study suggested that predominantly slow PLR in infants at high risk of cerebral palsy were associated with periventricular leukomalacia and poorer developmental outcome. Slow PLR might be an expression of white matter damage, resulting in dysfunction of the complex cortico-subcortical
circuitries. This article is protected by copyright. All rights reserved.

DOI: 10.1111/apa.13532
PMID: 27468114 [PubMed - as supplied by publisher]

Use of the Hammersmith Infant Neurological Examination in infants with cerebral palsy: a critical review of the literature.
Romeo DM, Ricci D, Brogna C, Mercuri E
Dev Med Child Neurol. 2016 Mar;58(3):240-5. doi: 10.1111/dmcn.12876. Epub 2015 Aug 25. Comment in Dev Med Child Neurol. 2016 Mar;58(3):219.

The Hammersmith Infant Neurological Examination (HINE) has been proposed as one of the early neurological examination tools for the diagnosis of cerebral palsy (CP). The aim of the present study was to critically review the existing literature and our experience with the use of the HINE in infants at risk of CP. The published papers confirm that the HINE can play an important role in the diagnosis and prognosis of infants at risk of developing CP, and provide information on aspects of neurological findings impaired in different forms of CP and brain lesions.

DOI: 10.1111/dmcn.12876
PMID: 26306473 [PubMed - indexed for MEDLINE]

Motricité - Mobilité – Posture

Anticipatory postural adjustments associated with a loading perturbation in children with hemiplegic and diplegic cerebral palsy.
Shiratori T, Girolami GL, Aruin AS
Exp Brain Res. 2016 Jun 20. [Epub ahead of print]

Anticipatory postural adjustments (APAs) in preparation for predictable externally induced loading perturbation were studied in children with typically development (TD), hemiplegic (HEMI), and diplegic (DIPL) cerebral palsy. Twenty-seven children (n = 9 in each group) were asked to stand and catch a load dropped from a pre-specified height. Electrical activity of the leg and trunk muscles and center of pressure (COP) displacements were recorded to quantify the APAs. All groups were able to generate APAs prior to the perturbation, but the magnitude was smaller and the onset was delayed in the dorsal (agonist) postural muscles in both HEMI and DIPL as compared to TD. HEMI and DIPL also generated APAs in the antagonist postural muscles. Anticipatory backward COP displacement was significantly different from the baseline value only in the TD and HEMI. HEMI and DIPL displayed a different postural control strategy; HEMI showed no difference in background postural activity from TD, but with diminished APAs in the agonist postural muscles compared to TD, while DIPL showed a higher background postural activity and diminished APAs in the agonist postural muscles compared to TD. These differences are important to consider when

designing rehabilitation programs to improve posture and movement control in children with hemiplegic and diplegic cerebral palsy.
DOI: 10.1007/s00221-016-4699-0
PMID: 27324084 [PubMed - as supplied by publisher]

Biomechanical analysis of gait termination in 11-17year old youth at preferred and fast walking speeds.
Ridge ST, Henley J, Manal K, Miller F, Richards JG
Hum Mov Sci. 2016 Jul 13;49:178-185. doi: 10.1016/j.humov.2016.07.001. [Epub ahead of print]

In populations where walking and/or stopping can be difficult, such as in children with cerebral palsy, the ability to quickly stop walking may be beyond the child's capabilities. Gait termination may be improved with physical therapy. However, without a greater understanding of the mechanical requirements of this skill, treatment planning is difficult. The purpose of this study was to understand how healthy children successfully terminate gait in one step when walking quickly, which can be challenging even for healthy children. Lower extremity kinematic and kinetic data were collected from 15 youth as they performed walking, planned, and unplanned stopping tasks. Each stopping task was performed as the subject walked at his/her preferred speed and a fast speed. The most significant changes in mechanics between speed conditions (preferred and fast) of the same stopping task were greater knee flexion angles (unplanned: +16.49±0.54°, p=0.00; planned: +15.75±1.1°, p=0.00) and knee extension moments (unplanned: +0.67±0.02N/kgm, p=0.00; planned: +0.57±0.23N/kgm, p=0.00) at faster speeds. The extra range of motion in the joints and extra muscle strength required to maintain the stopping position suggests that stretching and strengthening the muscles surrounding the joints of the lower extremity,
particularly the knee, may be a useful intervention.

DOI: 10.1016/j.humov.2016.07.001
PMID: 27423033 [PubMed - as supplied by publisher]

"Children with cerebral palsy experience greater levels of loading at the low back during gait compared to healthy controls".
Kiernan D, Malone A, O'Brien T, Simms CK
Gait Posture. 2016 Jul;48:249-55. doi: 10.1016/j.gaitpost.2016.06.004. Epub 2016 Jun 6.

Excessive trunk motion has been shown to be characteristic of cerebral palsy (CP) gait. However, the associated demands on the lower spine are unknown. This study investigated 3-dimensional reactive forces and moments at the low back in CP children compared to healthy controls. In addition, the impact of functional level of impairment was investigated (GMFCS levels). Fifty-two children with CP (26 GMFCS I and 26 GMFCS II) and 26 controls were recruited to the study. Three-dimensional thorax kinematics and reactive forces and moments at the low back (L5/S1 spine) were examined. Discrete kinematic and kinetic parameters were assessed between groups. Thorax movement demonstrated increased range for CP children in all 3 planes while L5/S1 reactive forces and moments increased with increasing level of functional impairment. Peak reactive force data were increased by up to 57% for GMFCS I and 63% for GMFCS II children compared to controls. Peak moment data were increased by up to 21% for GMFCS II children compared to GMFCS I and up to 90% for GMFCS II compared to control. In addition, a strong correlation was demonstrated between thorax side flexion and L5/S1 lateral bend moment ($r=0.519$, $p<0.01$) and medial/lateral force ($r=0.352$, $p<0.01$). Children with CP demonstrated increased lower spinal loading compared to TD. Furthermore, GMFCS II children demonstrated significantly more involvement. Intervention should be aimed at reducing excessive thorax movement, especially in the coronal plane, in order to reduce abnormal loading on the spine in this population.

DOI: 10.1016/j.gaitpost.2016.06.004
PMID: 27343832 [PubMed - in process]

Children with unilateral cerebral palsy show diminished implicit motor imagery with the affected hand.
Jongsma ML, Baas CM, Sangen AF, Aarts PB, van der Lubbe RH, Meulenbroek RG, Steenbergen B
Dev Med Child Neurol. 2016 Mar;58(3):277-84. doi: 10.1111/dmcn.12819. Epub 2015 Jun 11. Comment in Dev Med Child Neurol. 2016 Mar;58(3):223-4.

AIM: Motor imagery refers to the mental simulation of a motor action without producing an overt movement. Implicit motor imagery can be regarded as a first-person kinesthetic perceptual judgement, and addresses the capacity to engage into the manipulation of one's body schema. In this study, we examined whether children with unilateral cerebral palsy (CP) are able to engage in implicit motor imagery.
METHOD: A modified version of the hand laterality judgment task was employed. Erroneous responses, reaction times, and event-related potentials from the electroencephalograph were analysed.
RESULTS: In 13 children with typical development (mean age 10y 7mo, SD 1y 2mo; seven male, six female), we observed the classic rotation direction effect. Specifically, when comparing outward rotated with inward rotated hand pictures, decreased accuracy and increased response times were observed. Event-related potentials analyses of the electroencephalogram revealed a more marked N1 and an enhanced rotation-related negativity.
INTERPRETATION: These findings suggest that an implicit motor imagery strategy was used to solve the task. However, in 10 children with unilateral CP (mean age 10y 7mo, SD 2y 5mo; five male, five female), these effects were observed only when the less-affected hand was involved. This observation suggests that children with CP could benefit from visual training strategies.

DOI: 10.1111/dmcn.12819
PMID: 26095695 [PubMed - indexed for medline

Could lower leg Wartenberg test be used as a predictor of restrictions in temporomandibular joint movements in CP patients?
Syczewska M, Szczerbik E, Graff K, Olczak-Kowalczyk D, Dąbrowska-Gontarczyk A, Kalinowska M, Jelonek E
Acta Bioeng Biomech. 2016;18(2):3-7.

PURPOSE: Patients with spasticity suffer not only from neurological problems but also from various dentistry problems due to spasticity of the jaw muscles. Measurements of motion in temporomandibular joints should reflect the amount of abnormal muscle tone of these muscles. The aim of this study was to find out if the measurements of temporomandibular joint movements performed with the ultrasound Zebris device are different in cerebral palsy patients than in healthy subjects; and to find out if the information on the degree of spasticity in the lower legs provided by the Wartenberg test could be used to predict the degree of spasticty in the jaw muscles.
METHOD: Twenty five healthy subjects and 25 cerebral palsy patients participated in the study. Two types of measurements were performed: temporomandibular movements measured with Zebris device, and instrumented Wartenberg test.
RESULTS: The laterotrusion and opening movements are different in CP patients than in healthy subjects. Laterotrusion movement correlates with velocity measured during the Wartenberg test.
CONCLUSION: This finding suggests that high spasticity in the lower legs could indicate jaw movement restrictions in CP patients.
PMID: 27405291

Effect of Segmental Trunk Support on Posture and Reaching in Children With Cerebral Palsy.
Santamaria V, Rachwani J, Saavedra S, Woollacott M.
Pediatr Phys Ther. 2016 Fall;28(3):285-93. doi: 10.1097/PEP.0000000000000273.

PURPOSE: To test the effects of segmental trunk support on seated postural and reaching control in children with cerebral palsy.
METHODS: Seventeen children (age range 2-15 y, Gross Motor Function Classification System levels III-V) were classified with the Segmental Assessment of Trunk Control into mild (complete trunk control/lower lumbar deficits), moderate (thoracic/upper lumbar deficits), and severe (cervical/upper thoracic deficits). Postural and arm kinematics were measured while reaching with trunk support at axillae, mid-ribs, or pelvis.
RESULTS: Children in the mild group did not display changes in posture or reaching across conditions. The moderately involved group showed decrements in postural and reaching performance with pelvic compared with higher supports ($P < .01$). Children in the severe group were unable to maintain posture with pelvic support and showed postural deficiencies with mid-ribs compared with axillae support ($P < .01$).

CONCLUSIONS: Children with cerebral palsy and trunk dysfunction demonstrate improved motor performance when the external assistance matches their intrinsic level of trunk control.
DOI: 10.1097/PEP.0000000000000273
PMCID: PMC4922488 [Available on 2017-10-01]
PMID: 27341576 [PubMed - in process]

Effects of severity of gross motor disability on anticipatory postural adjustments while standing in individuals with bilateral spastic cerebral palsy.
Tomita H, Fukaya Y, Takagi Y, Yokozawa A
Res Dev Disabil. 2016 Jul 8;57:92-101. doi: 10.1016/j.ridd.2016.06.017. [Epub ahead of print]

BACKGROUND: Although individuals with bilateral spastic cerebral palsy (BSCP) exhibit several deficits in anticipatory postural adjustments (APAs) while standing, effects of severity of motor disability on their APAs are unclear.
AIMS: To determine whether individuals with BSCP exhibit severity-dependent deficits in APAs.
METHODS AND PROCEDURES: Seven individuals with level II BSCP (BSCP-II group) and seven with level III BSCP (BSCP-III group) according to the Gross Motor Function Classification System and seven healthy controls lifted a load under two different load conditions.
OUTCOMES AND RESULTS: Anticipatory activities of the erector spinae (ES), medial hamstring (MH), and gastrocnemius (GCM) were smaller in the two BSCP groups than in the control group. Although the anticipatory GCM activity was similar between the BSCP groups, the ES and MH activities were larger in the BSCP-II group than in the BSCP-III group. In the BSCP-II group, an increase in anticipatory activity with an increase in load was observed in the MH, but not in the GCM. In the BSCP-III group, load-related modulation was not found in the MH or GCM.
CONCLUSIONS AND IMPLICATIONS: The present findings suggest that in individuals with BSCP with severe motor disability, APA deficits extend to more proximal parts of the body.

DOI: 10.1016/j.ridd.2016.06.017
PMID: 27399205 [PubMed - as supplied by publisher]

Effect of supporting 3D-garment on gait postural stability in children with bilateral spastic cerebral palsy.
Degelaen M, De Borre L, Buyl R, Kerckhofs E, De Meirleir L, Dan B
NeuroRehabilitation. 2016 Jun 23. [Epub ahead of print]

BACKGROUND: Children with cerebral palsy show dysfunctional postural control which interferes with their functional performance and daily-life activities.
OBJECTIVE: The aim of the study was to identify the effect of a 3D supporting garment on trunk postural control and interjoint coordination during gait in children with bilateral cerebral palsy.
METHODS: We analyzed tridimensional trunk motion, trunk-thigh and interjoint coordination in 15 4-10 year-old children with bilateral spastic cerebral palsy (GMFCS I or II) and 16 4-10 year-old typically developing children while walking with or without a supporting garment.
RESULTS: We found significantly changes in the coordination between trunk and lower limbs in children with cerebral palsy. Step velocity and cadence both increased significantly in children with cerebral palsy but in controls, the cadence remained unaltered. Interjoint coordination between hip-knee and knee-ankle was altered during the stance phase only in the subgroup of children with cerebral palsy without any limitations in ankle joint passive range of motion.
CONCLUSION: 3D supporting garments improve trunk-thigh and lower limb interjoint coordination in walking in children with bilateral cerebral palsy.
DOI: 10.3233/NRE-161349
PMID: 27341370 [PubMed - as supplied by publisher]

Functional Task Constraints Foster Enhanced Postural Control in Children With Cerebral Palsy.
Schmit JM, Riley M, Cummins-Sebree S, Schmitt L, Shockley K
Phys Ther. 2016 Mar;96(3):348-54. doi: 10.2522/ptj.20140425. Epub 2015 Jun 25.

BACKGROUND: Postural instability is a classical characteristic of cerebral palsy (CP), but it has not been examined during functional play activity. Recent work has demonstrated that when motor tasks are made functionally more relevant, performance improves, even in children with movement pathology. It is possible that in a disease state, the underlying control mechanisms that are associated with healthy physiology must be elicited.
OBJECTIVE: The study objective was to explore the utility of the functional play task methodology as a more rich and interpretable approach to the quantification of postural instability in children with CP.
DESIGN: Postural stability measures obtained from a cross-sectional cohort of children with CP (n=30) were compared with stability measures taken from children with typical development (n=30) during a single measurement period.
METHODS: Postural stability data were obtained with a portable force platform system. Postural sway was quantified during a precision manual functional play task. A baseline condition (no task) also was included. Postural sway variability and postural sway regularity were analyzed with analyses of variance.
RESULTS: There was an apparent difference in postural control (greater irregularity, greater sway variability) during quiet stance between children with CP and peers with typical development; this difference was mitigated during the performance of the precision functional play task.
LIMITATIONS: A small and nonprobability sample of convenience may limit the findings of this study.
CONCLUSIONS: The findings illustrate flexibility and adaptability in the postural control system despite the pathological features associated with CP.

DOI: 10.2522/ptj.20140425
PMID: 26112256 [PubMed - indexed for MEDLINE]

Gait characteristics, balance performance and falls in ambulant adults with cerebral palsy: An observational study.
Morgan P, Murphy A, Opheim A, McGinley J
Gait Posture. 2016 Jul;48:243-8. doi: 10.1016/j.gaitpost.2016.06.015. Epub 2016 Jun 17.

The relationship between spatiotemporal gait parameters, balance performance and falls history was investigated in ambulant adults with cerebral palsy (CP). Participants completed a single assessment of gait using an instrumented walkway at preferred and fast speeds, balance testing (Balance Evaluation Systems Test; BESTest), and reported falls history. Seventeen ambulatory adults with CP, mean age 37 years, participated. Gait speed was typically slow at both preferred and fast speeds (mean 0.97 and 1.21m/s, respectively), with short stride length and high cadence relative to speed. There was a significant, large positive relationship between preferred gait speed and BESTest total score (ρ=0.573; $p<0.05$) and fast gait speed and BESTest total score (ρ=0.647, $p<0.01$). The stride lengths of fallers at both preferred and fast speeds differed significantly from non-fallers ($p=0.032$ and $p=0.025$, respectively), with those with a prior history of falls taking shorter strides. Faster gait speed was associated with better performance on tests of anticipatory and postural response components of the BESTest, suggesting potential therapeutic training targets to address either gait speed or balance performance. Future exploration of the implications of slow walking speed and reduced stride length on falls and community engagement, and the potential prognostic value of stride length on identifying falls risk is recommended.

DOI: 10.1016/j.gaitpost.2016.06.015
PMID: 27341531 [PubMed - in process]

Identification of common gait disruption patterns in children with cerebral palsy.
Davids JR, Bagley AM.
J Am Acad Orthop Surg. 2014 Dec;22(12):782-90. doi: 10.5435/JAAOS-22-12-782.

Identification and classification of common gait deviation patterns in children with cerebral palsy facilitates communication between healthcare providers, provides insight into the natural history of functional ambulation, guides clinical decision making, and clarifies outcomes assessment. Previous classification schemes have been based on experiential and intuitive approaches or systematic and analytical approaches. The current gait disruption classification system has been refined to incorporate the most clinically useful aspects of previous systems. This paradigm uses the concept of primary versus compensatory deviations to identify common patterns and common causes for these patterns. The primary sagittal plane patterns include jump, crouch, and stiff gait. The primary

transverse plane patterns include internal, external, and neutral progression gait. Apparent coronal plane deviation patterns are usually the consequence of sagittal and transverse plane deviations seen out of plane. Individualized assessment is essential because of the great variation in and combinations of possible patterns.

DOI: 10.5435/JAAOS-22-12-782
PMID: 25425613 [PubMed - indexed for MEDLINE]

Identification of joint patterns during gait in children with cerebral palsy: a Delphi consensus study.
Nieuwenhuys A, Õunpuu S, Van Campenhout A, Theologis T, De Cat J, Stout J, Molenaers G, De Laet T, Desloovere K
Dev Med Child Neurol. 2016 Mar;58(3):306-13. doi: 10.1111/dmcn.12892. Epub 2015 Aug 28.
Comment in Dev Med Child Neurol. 2016 Mar;58(3):228.

AIM: This study aims to achieve an international expert consensus on joint patterns during gait for children with cerebral palsy (CP) by means of Delphi surveys.
METHOD: In Stage 1, seven local experts drafted a preliminary proposal of kinematic patterns for each lower limb joint in the sagittal, coronal, and transverse plane. In Stage 2, 13 experts from eight gait laboratories (four in the USA and four in Europe), participated in a Delphi consensus study. Consensus was defined by a pre-set cut-off point of 75% agreement among participants.
RESULTS: After the first stage, 44 joint patterns were presented in a first survey and 29 patterns reached consensus. Consensus improved to 47 out of 48 patterns in the third survey. Only one pattern, 'abnormal knee pattern during loading response', did not reach consensus. The expert panel agreed to define six patterns for the knee during swing, most of them representing characteristics of a stiff knee pattern.
INTERPRETATION: The defined joint patterns can support clinical reasoning for children with CP as joint patterns during gait might be linked to different treatment approaches. Automating the classification process and incorporating additional trunk, foot, and electromyography features should be prioritized for the near future.

DOI: 10.1111/dmcn.12892
PMID: 26330338 [PubMed - indexed for MEDLINE]

Influence of External Visual Focus on Gait in Children With Bilateral Cerebral Palsy.
Bartonek A, Lidbeck CM, Gutierrez-Farewik EM.
Pediatr Phys Ther. 2016 Jul 14. [Epub ahead of print]

PURPOSE: To explore whether focusing a target influenced gait in children with cerebral palsy (CP) and typical development (TD).
METHODS: Thirty children with bilateral CP (Gross Motor Function Classification System [GMFCS] I-III) and 22 with TD looked at a light at walkway end (Gaze Target) while walking and returned (No Target).
RESULTS: During Gaze versus No Target, children with TD reduced temporal-spatial parameters and movements in the sagittal (SPM) and transverse planes. In comparison, during Gaze Target, children in CP1 (GMFCS I) had larger trunk SPM, children in CP2 (GMFCS II) larger neck (SPM), and children in CP3 (GMFCS III) greater head and neck frontal plane movements, and reduced cadence and single support.
CONCLUSIONS: Focusing a target altered gait in children with CP. Children in CP1 reduced movements similar to children with TD, children in CP2 behaved nearly unchanged, whereas children in CP3 reduced movements and temporal-spatial parameters, potentially as a consequence of lack of sensory information from lower limbs.
DOI: 10.1097/PEP.0000000000000282
PMID: 27428574 [PubMed - as supplied by publisher]

Motor imagery difficulties in children with Cerebral Palsy: A specific or general deficit?
Lust JM, Wilson PH, Steenbergen B
Res Dev Disabil. 2016 Jul 8;57:102-111. doi: 10.1016/j.ridd.2016.06.010. [Epub ahead of print]

AIM: The aim of this study was to examine the specificity of motor imagery (MI) difficulties in children with CP.

METHOD: Performance of 22 children with CP was compared to a gender and age matched control group. MI ability was measured with the Hand Laterality Judgment (HLJ) task, examining specifically the direction of rotation (DOR) effect, and the Praxis Imagery Questionnaire (PIQ).
RESULTS: In the back view condition of the HLJ task both groups used MI, as evidenced by longer response times for lateral compared with medial rotational angles. In the palm view condition children with CP did not show an effect of DOR, unlike controls. Error scores did not differ between groups. Both groups performed well on the PIQ, with no significant difference between them in response pattern.
CONCLUSION AND IMPLICATION: The present study suggests that children with CP show deficits on tasks that trigger implicit use of MI, whereas explicit MI ability was relatively preserved, as assessed using the PIQ. These results suggest that employing more explicit methods of MI training may well be more suitable for children with CP in rehabilitation of motor function.

DOI: 10.1016/j.ridd.2016.06.010
PMID: 27399206 [PubMed - as supplied by publisher]

Neuro-musculoskeletal simulation of instrumented contracture and spasticity assessment in children with cerebral palsy.
van der Krogt MM, Bar-On L, Kindt T, Desloovere K, Harlaar J
J Neuroeng Rehabil. 2016 Jul 16;13(1):64. doi: 10.1186/s12984-016-0170-5.

BACKGROUND: Increased resistance in muscles and joints is an important phenomenon in patients with cerebral palsy (CP), and is caused by a combination of neural (e.g. spasticity) and non-neural (e.g. contracture) components. The aim of this study was to simulate instrumented, clinical assessment of the hamstring muscles in CP using a conceptual model of contracture and spasticity, and to determine to what extent contracture can be explained by altered passive muscle stiffness, and spasticity by (purely) velocity-dependent stretch reflex.
METHODS: Instrumented hamstrings spasticity assessment was performed on 11 children with CP and 9 typically developing children. In this test, the knee was passively stretched at slow and fast speed, and knee angle, applied forces and EMG were measured. A dedicated OpenSim model was created with motion and muscles around the knee only. Contracture was modeled by optimizing the passive muscle stiffness parameters of vasti and hamstrings, based on slow stretch data. Spasticity was modeled using a velocity-dependent feedback controller, with threshold values derived from experimental data and gain values optimized for individual subjects. Forward dynamic simulations were performed to predict muscle behavior during slow and fast passive stretches. RESULTS: Both slow and fast stretch data could be successfully simulated by including subject-specific levels of contracture and, for CP fast stretches, spasticity. The RMS errors of predicted knee motion in CP were 1.1 ± 0.9° for slow and 5.9 ± 2.1° for fast stretches. CP hamstrings were found to be stiffer compared with TD, and both hamstrings and vasti were more compliant than the original generic model, except for the CP hamstrings. The purely velocity-dependent spasticity model could predict response during fast passive stretch in terms of predicted knee angle, muscle activity, and fiber length and velocity. Only sustained muscle activity, independent of velocity, was not predicted by our model.
CONCLUSION: The presented individually tunable, conceptual model for contracture and spasticity could explain most of the hamstring muscle behavior during slow and fast passive stretch. Future research should attempt to apply the model to study the effects of spasticity and contracture during dynamic tasks such as gait.
http://www.ncbi.nlm.nih.gov/pmc/articles/pmid/27423898/
DOI: 10.1186/s12984-016-0170-5
PMCID: PMC4947289
PMID: 27423898 [PubMed - in process]

Prevalence of specific gait abnormalities in children with cerebral palsy revisited: influence of age, prior surgery, and Gross Motor Function Classification System level.
Rethlefsen SA, Blumstein G, Kay RM, Dorey F, Wren TA
Dev Med Child Neurol. 2016 Jul 15. doi: 10.1111/dmcn.13205. [Epub ahead of print]

AIM: To examine the impact of age, surgery, and Gross Motor Function Classification System (GMFCS) level on the prevalence of gait problems in children with cerebral palsy (CP).

METHOD: Gait analysis records were retrospectively reviewed for ambulatory patients with CP. Gait abnormalities were identified using physical exam and kinematic data. Relationships among age, sex, previous surgery, GMFCS level, and prevalence of gait abnormalities associated with crouch and out-toeing, and equinus and in-toeing were assessed using univariable and multivariable logistic regression.
RESULTS: One-thousand and five records were reviewed. The most common gait problems were in-toeing, excessive knee flexion, stiff knee, hip flexion, internal rotation, adduction, and equinus (all >50%). Odds ratios (OR) for various gait problems associated with crouch and out-toeing increased (OR 1.07-1.32), and those associated with equinus and in-toeing decreased (OR 0.80-0.94) significantly with increasing age for patients in GMFCS levels I to III. The same trends were seen with prior surgery (OR for crouch and out-toeing: 1.86-7.14; OR for equinus and in-toeing: 0.16-0.59).
INTERPRETATION: The prevalence of gait abnormalities varies by GMFCS level, but similarities exist among levels. The study results suggest that in younger children, particularly those in GMFCS levels III and IV, treatments for equinus and in-toeing should be undertaken with caution because these problems tend to decrease with age even without orthopedic intervention. Such children may end up with the 'opposite' deformities of calcaneal crouch and out-toeing, which tend to increase in prevalence with age.

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PMID: 27421715 [PubMed - as supplied by publisher]

Progression of Hip Displacement during Radiographic Surveillance in Patients with Cerebral Palsy.
Park JY, Choi Y, Cho BC, Moon SY, Chung CY, Lee KM, Sung KH, Kwon SS, Park MS
J Korean Med Sci. 2016 Jul;31(7):1143-9. doi: 10.3346/jkms.2016.31.7.1143. Epub 2016 May 19.

Progression of hip displacement is common in patients with cerebral palsy (CP). We aimed to investigate the rate of progression of hip displacement in patients with CP by assessing changes in radiographic indices according to Gross Motor Function Classification System (GMFCS) level during hip surveillance. We analyzed the medical records of patients with CP aged < 20 years who underwent at least 6 months interval of serial hip radiographs before any surgical hip intervention, including reconstructive surgery. After panel consensus and reliability testing, radiographic measurements of migration percentage (MP), neck-shaft angle (NSA), acetabular index (AI), and pelvic obliquity (PO) were obtained during hip surveillance. For each GMFCS level, annual changes in radiographic indices were analyzed and adjusted for affecting factors, such as sex, laterality, and type of CP. A total of 197 patients were included in this study, and 1,097 radiographs were evaluated. GMFCS classifications were as follows: 100 patients were level I-III, 48 were level IV, and 49 were level V. MP increased significantly over the duration of hip surveillance in patients with GMFCS levels I-III, IV, and V by 0.3%/year ($P < 0.001$), 1.9%/year ($P < 0.001$), and 6.2%/year ($P < 0.001$), respectively. In patients with GMFCS level IV, NSA increased significantly by 3.4°/year ($P < 0.001$). Our results suggest that periodic monitoring and radiographic hip surveillance is warranted for patients with CP, especially those with GMFCS level IV or V. Furthermore, physicians can predict and inform parents or caregivers regarding the progression of hip displacement in patients with CP.
Free PMC Article
DOI: 10.3346/jkms.2016.31.7.1143
PMCID: PMC4901009
PMID: 27366015 [PubMed - in process]

Relationship between static postural control and the level of functional abilities in children with cerebral palsy.
[Article in English, Portuguese]
Pavão SL, Nunes GS, Santos AN, Rocha NA
Braz J Phys Ther. 2014 Jul-Aug;18(4):300-7. Epub 2014 Jul 18.

BACKGROUND: Postural control deficits can impair functional performance in children with cerebral palsy (CP) in daily living activities.
OBJECTIVE: To verify the relationship between standing static postural control and the functional ability level in children with CP.
METHOD: The postural control of 10 children with CP (gross motor function levels I and II) was evaluated during static standing on a force platform for 30 seconds. The analyzed variables were the anteroposterior (AP) and

mediolateral (ML) displacement of the center of pressure (CoP) and the area and velocity of the CoP oscillation. The functional abilities were evaluated using the mean Pediatric Evaluation of Disability Inventory (PEDI) scores, which evaluated self-care, mobility and social function in the domains of functional abilities and caregiver assistance.
RESULTS: Spearman's correlation test found a relationship between postural control and functional abilities. The results showed a strong negative correlation between the variables of ML displacement of CoP, the area and velocity of the CoP oscillation and the PEDI scores in the self-care and caregiver assistance domains. Additionally, a moderate negative correlation was found between the area of the CoP oscillation and the mobility scores in the caregiver assistance domain. We used a significance level of 5% ($p < 0.05$).
CONCLUSIONS: We observed that children with cerebral palsy with high CoP oscillation values had lower caregiver assistance scores for activities of daily living (ADL) and consequently higher levels of caregiver dependence. These results demonstrate the repercussions of impairments to the body structure and function in terms of the activity levels of children with CP such that postural control impairments in these children lead to higher requirements for caregiver assistance.
Free PMC Article
PMCID: PMC4183259
PMID: 25054383 [PubMed - indexed for MEDLINE

Reliability and validity of Edinburgh visual gait score as an evaluation tool for children with cerebral palsy.
Del Pilar Duque Orozco M, Abousamra O, Church C, Lennon N, Henley J, Rogers KJ, Sees JP, Connor J, Miller F
Gait Posture. 2016 Jun 15;49:14-18. doi: 10.1016/j.gaitpost.2016.06.017. [Epub ahead of print]

Assessment of gait abnormalities in cerebral palsy (CP) is challenging, and access to instrumented gait analysis is not always feasible. Therefore, many observational gait analysis scales have been devised. This study aimed to evaluate the interobserver reliability, intraobserver reliability, and validity of Edinburgh visual gait score (EVGS). Video of 30 children with spastic CP were reviewed by 7 raters (10 children each in GMFCS levels I, II, and III, age 6-12 years). Three observers had high level of experience in gait analysis (10+ years), two had medium level (2-5 years) and two had no previous experience (orthopedic fellows). Interobserver reliability was evaluated using percentage of complete agreement and kappa values. Criterion validity was evaluated by comparing EVGS scores with 3DGA data taken from the same video visit. Interobserver agreement was 60-90% and Kappa values were 0.18-0.85 for the 17 items in EVGS. Reliability was higher for distal segments (foot/ankle/knee 63-90%; trunk/pelvis/hip 60-76%), with greater experience (high 66-91%, medium 62-90%, no-experience 41-87%), with more EVGS practice (1st 10 videos 52-88%, last 10 videos 64-97%) and when used with higher functioning children (GMFCS I 65-96%, II 58-90%, III 35-65%). Intraobserver agreement was 64-92%. Agreement between EVGS and 3DGA was 52-73%. We believe that having EVGS as part of the standardized gait evaluation is helpful in optimizing the visual scoring. EVGS can be a supportive tool that adds quantitative data instead of only qualitative assessment to a video only gait evaluation.

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PMID: 27344448 [PubMed - as supplied by publisher]

Restricted Arm Swing Affects Gait Stability and Increased Walking Speed Alters Trunk Movements in Children with Cerebral Palsy.
Delabastita T, Desloovere K, Meyns P
Front Hum Neurosci. 2016 Jul 15;10:354. doi: 10.3389/fnhum.2016.00354. eCollection 2016.

Observational research suggests that in children with cerebral palsy, the altered arm swing is linked to instability during walking. Therefore, the current study investigates whether children with cerebral palsy use their arms more than typically developing children, to enhance gait stability. Evidence also suggests an influence of walking speed on gait stability. Moreover, previous research highlighted a link between walking speed and arm swing. Hence, the experiment aimed to explore differences between typically developing children and children with cerebral palsy taking into account the combined influence of restricting arm swing and increasing walking speed on gait stability. Spatiotemporal gait characteristics, trunk movement parameters and margins of stability were obtained using three dimensional gait analysis to assess gait stability of 26 children with cerebral palsy and 24 typically developing children. Four walking conditions were evaluated: (i) free arm swing and preferred walking speed; (ii) restricted arm swing and preferred walking speed; (iii) free arm swing and high walking speed; and (iv) restricted arm swing and

high walking speed. Double support time and trunk acceleration variability increased more when arm swing was restricted in children with bilateral cerebral palsy compared to typically developing children and children with unilateral cerebral palsy. Trunk sway velocity increased more when walking speed was increased in children with unilateral cerebral palsy compared to children with bilateral cerebral palsy and typically developing children and in children with bilateral cerebral palsy compared to typically developing children. Trunk sway velocity increased more when both arm swing was restricted and walking speed was increased in children with bilateral cerebral palsy compared to typically developing children. It is proposed that facilitating arm swing during gait rehabilitation can improve gait stability and decrease trunk movements in children with cerebral palsy. The current results thereby partly support the suggestion that facilitating arm swing in specific situations possibly enhances safety and reduces the risk of falling in children with cerebral palsy.

Free PMC Article

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PMCID: PMC4945643
PMID: 27471457 [PubMed]

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

Early Hum Dev. 2015 Oct;91(10):555-8. doi: 10.1016/j.earlhumdev.2015.07.001. Epub 2015 Jul 25.

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.

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PMID: 26217934 [PubMed - indexed for MEDLINE]

The arm posture in children with unilateral Cerebral Palsy is mainly related toantero-posterior gait instability.

Meyns P, Duysens J, Desloovere K

Gait Posture. 2016 Jun 27;49:132-135. doi: 10.1016/j.gaitpost.2016.06.033. [Epub ahead of print]

In this observational case-control study we aimed to determine whether altered arm postures in children with unilateral CP (uniCP) are related to gait instability in a specific direction. Antero-posterior and medio-lateral Foot Placement Estimator instability measures and arm posture measures (vertical and antero-posterior hand position, sagittal and frontal upper arm elevation angle) were determined in eleven uniCP (7 years-10 months) and twenty-four typically developing children (9 years-6 months) at two walking speeds. Spearman-rank correlation analyses were made to examine the relationship between antero-posterior and medio-lateral arm posture and gait instability. Arm posture in both planes was related to antero-posterior instability (e.g. sagittal and frontal upper arm elevation angle correlated moderately with antero-posterior instability; $R=0.41$, $p<0.001$, $R=-0.47$, $p<0.001$). In uniCP, increased antero-posterior instability was associated with a higher ($R=-0.62$, $p=0.002$) and more frontal position of

the hemiplegic hand (R=-0.58, p=0.005), while the non-hemiplegic upper arm was rotated more backward (R=0.63, p=0.002) and both upper arms rotated more sideways (hemiplegic: R=-0.58, p=0.004; non-hemiplegic: R=-0.55, p=0.008). The altered non-hemiplegic (sagittal and frontal) arm posture in uniCP may be a compensation to reduce antero-posterior gait instability.

DOI: 10.1016/j.gaitpost.2016.06.033
PMID: 27414040 [PubMed - as supplied by publisher]

The effect of postural control and balance on femoral anteversion in children with spastic cerebral palsy.
Karabicak GO, Balcı NC, Gulsen M, Ozturk B, Cetin N
J Phys Ther Sci. 2016 Jun;28(6):1696-700. doi: 10.1589/jpts.28.1696. Epub 2016 Jun 28.

[Purpose] The aim of the study was to investigate the relationships between femoral anteversion and functional balance and postural control in children with spastic cerebral palsy.
[Subjects and Methods] Twenty children with spastic cerebral palsy (mean age=12.4 ± 4.5) with grosss motor functional classification system levels I, II, and III were recruited for this study. Functional balance was evaluated using the Pediatric Balance Scale, postural control was evaluated using the Trunk Control Measurement Scale, and femoral anteversion was assessed with a handheld goniometer using the great trochanter prominence method.
[Results] The results indicated that there was significant correlation between femoral anteversion and Trunk Control Measurement Scale dynamic reaching score. There were no significant correlation between femoral anteversion and the Trunk Control Measurement Scale static sitting balance, Trunk Control Measurement Scale selective movement control, total Trunk Control Measurement Scale and Pediatric Balance Scale results.
[Conclusion] Increased femoral anteversion has not correlation with functional balance, static sitting, and selective control of the trunk. Femoral anteversion is related to dynamic reaching activities of the trunk, and this may be the result of excessive internal pelvic rotation. It is important for the health professionals to understand that increased femoral anteversion needs to be corrected because in addition to leading to femoral internal rotation during walking, it also effects dynamic reaching activities of spastic children with cerebral palsy.
Free PMC Article
DOI: 10.1589/jpts.28.1696
PMCID: PMC4932038
PMID: 27390397 [PubMed]

The relation between mirror movements and non-use of the affected hand in children with unilateral cerebral palsy.
Zielinski IM, Green D, Rudisch J, Jongsma ML, Aarts PB, Steenbergen B
Dev Med Child Neurol. 2016 Jul 16. doi: 10.1111/dmcn.13204. [Epub ahead of print]

AIM: In children with unilateral cerebral palsy (CP), it is widely believed that mirror movements contribute to non-use of the affected hand despite preserved capacity, a phenomenon referred to as developmental disregard. We aimed to test whether mirror movements are related to developmental disregard, and to clarify the relation between mirror movements and bimanual function.
METHOD: A repetitive squeezing task simultaneously measuring both hands' grip-forces was developed to assess mirror movements by using maximum cross-correlation coefficient (CCCmax) as well as strength measures (MMstrength). Developmental disregard, bimanual performance, and capacity were assessed using a validated video-observation method. Twenty-one children with unilateral CP participated (Median age 10y 7mo, interquartile range [IQR] 10y 1mo-12y 9mo). Outcome measures of mirror movements were correlated to developmental disregard, bimanual performance, and capacity scores using Spearman's correlations (significance level: $\alpha<0.05$).
RESULTS: Mirror movements were not related to developmental disregard. However, enhanced mirror movements in the less-affected hand were related to reduced performance (CCCmax : $\rho=-0.526$, $p=0.007$; MMstrength : $\rho=-0.750$, $p<0.001$) and capacity (CCCmax : $\rho=-0.410$, $p=0.033$; MMstrength : $\rho=-0.679$, $p<0.001$). These relations were only moderate (performance:MMstrength : $\rho=-0.504$, $p=0.010$), low (capacity: MMstrength : $\rho=-0.470$, $p=0.016$) or absent for mirror movements in the affected hand. Additionally, seven children showed stronger movements in their less-affected hands when actually being asked to move their affected hand.

INTERPRETATION: These findings show no relation between mirror movements and developmental disregard, but support an association between mirror movements and bimanual function.

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PMID: 27421246 [PubMed - as supplied by publisher]

Three-dimensional evaluation of skeletal deformities of the pelvis and lower limbs in ambulant children with cerebral palsy.
Massaad A, Assi A, Bakouny Z, Sauret C, Khalil N, Skalli W, Ghanem I
Gait Posture. 2016 Jun 23;49:102-107. doi: 10.1016/j.gaitpost.2016.06.029. [Epub ahead of print]

Skeletal abnormalities, affecting posture and walking pattern, increase with motor impairment in children with cerebral palsy (CP). However, it is not known whether these skeletal malalignments occur in children with slight motor impairment. Our aim was to evaluate skeletal malalignment at the level of thepelvis and lower limbs in ambulant children with CP, with slight motor impairment, using a low dose biplanar X-ray technique. Twenty-seven children with spastic CP (mean age: 10.9±4years, 7 Hemiplegia, 20 Diplegia, GMFCS levels I:17, II:10), with no previous treatments at the hips and knees, underwent EOS(®) biplanar X-rays. A control group consisting of 22 typically developing children was also included. Three-dimensional reconstructions of the pelvis and lower limbs were performed in order to calculate 11 radiological parameters related to the pelvis, acetabulum and lower limbs. Pelvic incidence and sacral slope were significantly increased in children with CP compared to TD children (48°±7° vs. 43°±8°, 42°±7° vs. 38°±5°, respectively, p=0.003). Acetabular parameters did not significantly differ between the two groups. Femoral anteversion and neck shaft angle were significantly increased in children with CP (25°±12° vs. 14°±7°, p<0.001; 134°±5° vs. 131°±5°, p=0.005 respectively). No difference was found for tibial torsion. This study showed that even slightly impaired children with CP have an anteverted and abducted femur and present positional and morphological changes of the pelvis in the sagittal plane. The orientation of the acetabulum in 3D seems to not be affected when children with CP present slight motor impairment.

DOI: 10.1016/j.gaitpost.2016.06.029
PMID: 27395450 [PubMed - as supplied by publisher]

Traitement - Rééducation motrice et cognitive

Pharmacologie Efficacite Tolérance

AbobotulinumtoxinA for Equinus Foot Deformity in Cerebral Palsy: A Randomized Controlled Trial.
Delgado MR, Tilton A, Russman B, Benavides O, Bonikowski M, Carranza J, Dabrowski E, Dursun N, Gormley M, Jozwiak M, Matthews D, Maciag-Tymecka I, Unlu E, Pham E, Tse A, Picaut P
Pediatrics. 2016 Feb;137(2):e20152830. doi: 10.1542/peds.2015-2830. Epub 2016 Jan 26.

BACKGROUND: Although botulinum toxin is a well-established treatment of focal spasticity in cerebral palsy, most trials have been small, and few have simultaneously assessed measures of muscle tone and clinical benefit.
METHODS: Global, randomized, controlled study to assess the efficacy and safety of abobotulinumtoxinA versus placebo in cerebral palsy children with dynamic equinus foot deformity. Patients were randomized (1:1:1) to abobotulinumtoxinA 10 U/kg/leg, 15 U/kg/leg, or placebo injections into the gastrocnemius-soleus complex (1 or both legs injected). In the primary hierarchical analysis, demonstration of benefit for each dose required superiority to placebo on the primary (change in Modified Ashworth Scale from baseline to week 4) and first key secondary (Physician's Global Assessment at week 4) end points.
RESULTS: Two hundred and forty-one patients were randomized, and 226 completed the study; the intention to treat population included 235 patients (98%). At week 4, Modified Ashworth Scale scores significantly improved with abobotulinumtoxinA; mean (95% confidence interval) treatment differences versus placebo were -0.49 (-0.75 to -0.23; P = .0002) for 15 U/kg/leg and -0.38 (-0.64 to -0.13; P = .003) for 10 U/kg/leg. The Physician's Global Assessment treatment differences versus placebo of 0.77 (0.45 to 1.10) for 15 U/kg/leg and 0.82 (0.50 to 1.14) for 10

U/kg/leg were also significant (both Ps < .0001). The most common treatment-related adverse event was muscular weakness (10 U/Kg/leg = 2; placebo = 1).
CONCLUSIONS: AbobotulinumtoxinA improves muscle tone in children with dynamic equinus resulting in an improved overall clinical impression and is well tolerated.

DOI: 10.1542/peds.2015-2830
PMID: 26812925 [PubMed - indexed for MEDLINE]

Botulinum neurotoxin treatment in children with cerebral palsy: validation of a needle placement protocol using passive muscle stretching and relaxing.
Warnink-Kavelaars J, Vermeulen RJ, Buizer AI, Becher JG
Dev Med Child Neurol. 2016 Jul 6. doi: 10.1111/dmcn.13176. [Epub ahead of print]

AIM: To validate a detailed intramuscular needle placement protocol using passive muscle stretching and relaxing for botulinum neurotoxin type A (BoNT-A) treatment in the lower extremity of children with spastic cerebral palsy (CP), with verification by electrical stimulation.
METHOD: A prospective observational study was performed in 75 children with spastic CP who received regular BoNT-A treatment under general anaesthesia (52 males, 23 females; mean age 8y 9mo, SD 3y 7mo, range 4-18y; mean body mass index 16.2, SD 3.7, range 7.7-26.7). A total of 1084 intramuscular needle placements using passive muscle stretching and relaxing were verified by electrical stimulation. Primary outcome was the positive predictive value.
RESULTS: Intramuscular needle placement in the muscles adductor brevis, adductor longus, gracilis, semimembranosus, semitendinosus, biceps femoris, rectus femoris, and lateral and medial heads of the gastrocnemius and soleus had a positive predictive value ranging from 85.7% to 100% (95% confidence interval ranging from 71.5-89.9% to 91.4-100%).
INTERPRETATION: This validated detailed protocol for intramuscular needle placement using passive muscle stretching and relaxing for BoNT-A treatment in the lower extremity of children with spastic CP is reliable and has a high positive predictive value.

DOI: 10.1111/dmcn.13176
PMID: 27381267 [PubMed - as supplied by publisher]

Comparison between an Ascenda and a silicone catheter in intrathecal baclofen therapy in pediatric patients: analysis of complications.
Motta F, Antonello CE
J Neurosurg Pediatr. 2016 Jun 24:1-6. [Epub ahead of print]

OBJECTIVE In this single-center study the authors investigated the complications occurring before and after the introduction of the new Ascenda intrathecal catheter (Medtronic Inc.) in pediatric patients treated with intrathecal baclofen therapy (ITB) for spasticity and/or dystonia. METHODS This was a retrospective review of 508 children who had received ITB, 416 with silicone catheters in the 13 years between September 1998 and September 2011 and 92 with Ascenda catheters in the 3 years between September 2011 and August 2014. The authors evaluated major complications such as infections, CSF leaks treated, and problems related to the catheter or pump, and they compared the 2 groups of patients who had received either a silicone catheter or an Ascenda catheter implant. RESULTS One hundred twenty patients in the silicone group (29%) and 1 patient in the Ascenda group (1.1%; p < 0.001) had a major complication. In the silicone group 23 patients (5.5%) were affected by CSF leakage and 75 patients (18%) experienced 82 catheter-related events, such as occlusion, dislodgment, disconnection, or breakage, which required catheter replacement. In the Ascenda group, only 1 patient (1.1%) was affected by CSF leakage. CONCLUSIONS To the authors' knowledge, this study is the first in the literature to compare the performance of the new Ascenda catheter, introduced in 2011, with the traditional silicone catheter for intrathecal drug infusion. In their analysis, the authors found that the Ascenda catheter can reduce major complications related to the catheter after ITB pump implantation. Further investigation is necessary to expand on and confirm their results.
DOI: 10.3171/2016.4.PEDS15646
PMID: 27341610 [PubMed - as supplied by publisher]

Long-term follow-up for lumbar intrathecal baclofen catheters placed using the paraspinal subfascial technique.
Thakur SK, Rubin BA, Harter DH
Neurosurg Pediatr. 2016 Mar;17(3):357-60. doi: 10.3171/2015.7.PEDS15137. Epub 2015 Nov 20.

OBJECT Intrathecal baclofen (ITB) is a valuable therapeutic option for patients with spasticity and dystonia. The techniques that place an ITB pump catheter into the subcutaneous fat of a lumbar incision are well described. Because patients who require ITB often have low body fat content, they may be predisposed to catheter-related complications. The senior author used a novel technique to place the catheter in a paraspinal subfascial fashion, and the short-term results were previously published. That study demonstrated no development of hardware erosions, catheter migrations, or CSF leaks within an average follow-up of 5 months. This study followed up on those initial findings by looking at the long-term outcomes since this technique was introduced.
METHODS Using the institutional review board-approved protocol, the electronic medical records were reviewed retrospectively for all patients who underwent paraspinal subfascial catheter placement by the senior author. Patients received follow-up with the surgeon at 2 weeks postoperatively and were followed routinely by their physiatrist thereafter. RESULTS Of the 43 patients identified as having undergone surgery by the senior author using the paraspinal subfascial technique between July 2010 and February 2014, 12 patients (27.9%) required reoperation. There were 5 patients (11.6%) who had complications related to the catheter or lumbar incision. No hardware erosions or CSF leaks were identified. These patients received a median follow-up of 3.0 years, with 30 of 43 patients receiving follow-up over 2.0 years.
CONCLUSION This follow-up study suggests that the technique of paraspinal subfascial catheter placement translates to long-term decreases in CSF leakage and complications from erosion, infection, and also catheter malfunctions. It does not seem to affect the overall rate of complications.
DOI: 10.3171/2015.7.PEDS15137
PMID: 26588457 [PubMed - indexed for MEDLINE]

Real-World, Long-Term Quality of Life Following Therapeutic OnabotulinumtoxinA Treatment.
Jog M, Wein T, Bhogal M, Dhani S, Miller R, Ismail F, Beauchamp R, Trentin G
Can J Neurol Sci. 2016 Jul 19:1-10. [Epub ahead of print]

BACKGROUND: OnabotulinumtoxinA is an efficacious treatment option for patients with various conditions. Although studies have reported on the efficacy of onabotulinumtoxinA, quality of life (QoL) data are limited. This study evaluated QoL in patients treated with onabotulinumtoxinA across various therapeutic indications.
METHODS: MDs on BOTOX Utility (MOBILITY) was a prospective, multicenter, observational Canadian study in patients initiating (naïve) or receiving ongoing (maintenance) onabotulinumtoxinA treatment. Health utility was the primary outcome measure and was obtained from the Short Form-12 Health Survey using the Short Form-6D at baseline, week 4 posttreatment, and up to five subsequent treatment visits. The safety cohort included patients who received ≥1 onabotulinumtoxinA treatment.
RESULTS: The efficacy cohort included 1062 patients; the majority were Caucasian, female, and on maintenance onabotulinumtoxinA treatment. Adult focal spasticity (n=398), blepharospasm (n=81), cerebral palsy (n=22), cervical dystonia (n=234), hemifacial spasm (n=116), and hyperhidrosis (n=211) patients were included. Baseline health utility was generally higher in maintenance versus naïve patients; however, naïve patients showed the greatest improvements over time. Health utility was generally maintained or trended toward improvement across all cohorts, including maintenance patients who had been treated for up to 22 years before study entry. Eighteen of 1222 patients (2%) in the safety cohort reported 28 treatment-related adverse events; eight were serious in four patients.
CONCLUSION: MOBILITY is the largest prospective study to date to provide QoL data over a variety of therapeutic indications following treatment with onabotulinumtoxinA. Although the QoL burden varies by disease, data suggest that long-term treatment may help improve or maintain QoL over time.
DOI: 10.1017/cjn.2016.262
PMID: 27430524 [PubMed - as supplied by publisher]

Chirurgie

A balanced approach for stable hips in children with cerebral palsy: a combination of moderate VDRO and pelvic osteotomy.

Reidy K, Heidt C, Dierauer S, Huber H

J Child Orthop. 2016 Aug;10(4):281-8. doi: 10.1007/s11832-016-0753-5. Epub 2016 Jun 27.

BACKGROUND: Hip reconstructive surgery in cerebral palsy (CP) patients necessitates either femoral varus derotational osteotomy (VDRO) or pelvic osteotomy, or both. The purpose of this study is to review the results of a moderate varisation [planned neck shaft angle (NSA) of 130°] in combination with pelvic osteotomy for a consecutive series of patients.

METHODS: Patients with CP who had been treated at our institution for hip dysplasia, subluxation or dislocation with VDRO in combination with pelvic osteotomy between 2005 and 2010 were reviewed.

RESULTS: Forty patients with a mean follow-up of 5.4 years were included. The mean age at the time of operation was 8.9 years. The majority were non-ambulant children [GMFCS I-III: n = 11 (27.5 %); GMFCS IV-V: n = 29 (72.5 %)]. In total, 57 hips were treated with both femoral and pelvic osteotomy. The mean pre-operative NSA angle of 152.3° was reduced to 132.6° post-operatively. Additional adductor tenotomy was performed in nine hips (16 %) at initial operation. Reimers' migration percentage (MP) was improved from 63.6 % pre-operatively to 2.7 % post-operatively and showed a mean of 9.7 % at the final review. The results were good in 96.5 % (n = 55) with centred, stable hips (MP <33 %), fair in one with a subluxated hip (MP 42 %) and poor in one requiring revision pelvic osteotomy for ventral instability.

CONCLUSIONS: This approach maintains good hip abduction and reduces soft-tissue surgery. Moderate varisation in VDRO in combination with pelvic osteotomy leads to good mid-term results with stable, pain-free hips, even in patients with severe spastic quadriplegia.

Free PMC Article

DOI: 10.1007/s11832-016-0753-5
PMCID: PMC4940248
PMID: 27349432 [PubMed]

Biomechanical Study of the Digital Flexor Tendon Sliding Lengthening Technique.

Hashimoto K, Kuniyoshi K, Suzuki T, Hiwatari R, Matsuura Y, Takahashi K

J Hand Surg Am. 2015 Oct;40(10):1981-5. doi: 10.1016/j.jhsa.2015.06.120. Epub 2015 Aug 22.

PURPOSE: To compare the mechanical properties of sliding lengthening (SL) and Z-lengthening (ZL) for flexor tendon elongation used for conditions such as Volkmann contracture, cerebral palsy, and poststroke spasticity.

METHODS: We harvested 56 flexor tendons, including flexor pollicis longus tendons, flexor digitorum superficialis tendons (zones II to IV), and flexor digitorum profundus tendons (zones II to V) from 24 upper limbs of 12 fresh cadavers. Each tendon was harvested together with its homonymous tendon from the opposite side of the cadaver and paired. We used 28 pairs of tendons and divided them randomly into 4 groups depending on the lengthening distance (20 or 30 mm) and type of stitching (single or double mattress sutures). Then we divided each pair into either the SL or ZL group. Each group was composed of 7 specimens. The same surgeon lengthened all tendons and stitched them with 2-0 polyester sutures. We tested biomechanical tensile strength immediately after completing lengthening and suturing in each group.

RESULTS: Ultimate tensile strengths were: 23 N for the SL 20-mm lengthening and single mattress suture and 7 N for the ZL; 25 N for the SL 20-mm lengthening and double mattress suture and 10 N for the ZL; 15 N for the SL 30-mm lengthening and single mattress suture and 8 N for the ZL; and 18 N for the SL 30-mm lengthening and double mattress suture and 10 N for the ZL.

CONCLUSIONS: The SL technique may be a good alternative to the ZL technique because it provides higher ultimate tensile strength.

CLINICAL RELEVANCE: Because of its higher ultimate tensile strength, the SL technique may allow for earlier rehabilitation and reduced risk of postoperative complications.

DOI: 10.1016/j.jhsa.2015.06.120
PMID: 26304736 [PubMed - indexed for MEDLINE]

Cerebral Palsy Tendon Transfers: Flexor Carpi Ulnaris to Extensor Carpi Radialis Brevis and Extensor Pollicis Longus Reroutement.

Bansal A, Wall LB, Goldfarb CA

Hand Clin. 2016 Aug;32(3):423-30. doi: 10.1016/j.hcl.2016.03.010. Epub 2016 May 21.

The flexor carpi ulnaris to extensor carpi radialis brevis transfer and extensor pollicis longus rerouting combined with thenar release are 2 successful surgical interventions for children with spastic cerebral palsy. The goal of both procedures is to improve quality of life for patients who have previously failed conservative management, and the degree of expected improvement is predicated on several patient variables, making careful patient selection crucial for ensuring successful outcomes. Here, surgical technique is described; risk factors are discussed, and outcomes related to both procedures are presented.

DOI: 10.1016/j.hcl.2016.03.010
PMID: 27387086 [PubMed - in process]

Comparison of Allograft and Bovine Xenograft in Calcaneal Lengthening Osteotomy for Flatfoot Deformity in Cerebral Palsy.

Rhodes J(1), Mansour A, Frickman A, Pritchard B, Flynn K, Pan Z, Chang F, Miller N.

J Pediatr Orthop. 2016 Jul 2. [Epub ahead of print]

BACKGROUND: The Evan's calcaneal lengthening osteotomy is a treatment method for spastic flatfoot deformity in patients with cerebral palsy that fail nonoperative measures. Autograft and allograft have been reported as potential graft choices. Bovine xenograft has been introduced as an alternative, but limited human data exists supporting its efficacy. This study compares the long-term results of allograft versus xenograft in isolated Evan's procedure performed for correction of flexible spastic flatfoot deformity.
METHODS: This retrospective study accessed charts of 4- to 18-year-olds diagnosed with cerebral palsy who received an Evan's procedure. Preoperative and postoperative radiographic measurements (lateral calcaneal pitch, lateral talocalcaneal, lateral talo-first metatarsal, anteroposterior talonavicular coverage, anteroposterior talo-first metatarsal), graft incorporation, recurrence, secondary procedures, and complications were recorded and analyzed between graft types.
RESULTS: Sixty-three feet (34 allograft and 29 xenograft) in 36 patients (mean age 9.3 y) were included. Gross Motor Function Classification System between groups was significant (P=0.001). Mean time for preoperative x-rays was 5.3 months before day of surgery (DOS) for allograft and 3.6 months for xenograft. Mean time of first and last postoperative x-ray for allograft was 3.6 and 39.5 months, respectively; for xenograft, 1.8 and 35.1 months, respectively. There was a significant difference in timing of preoperative x-ray to DOS and DOS to first postoperative x-ray (P=0.012, 0.006, respectively). Radiographically, xenograft retained postoperative improvement better than allograft, yet allograft had a higher grade 4 incorporation rate (P=0.036). The allograft group experienced significantly more cast pressure ulcers (P=0.006), but no other differences in complications between groups, and no infections were reported in either group.
CONCLUSIONS: Allograft incorporated better than xenograft, likely with a greater potential to reach grade 5 incorporation, yet both groups retained postoperative improvement. Results indicate both grafts are appropriate; yet incorporation rate could affect correction maintenance, and should be considered during graft selection for Evan's procedure.
LEVEL OF EVIDENCE: This study presents clinical results using a novel bone graft material. Level III-retrospective comparative study.
DOI: 10.1097/BPO.0000000000000822
PMID: 27379788 [PubMed - as supplied by publisher]

Differences in health-related quality of life and caregiver burden after hip and spine surgery in non-ambulatory children with severe cerebral palsy.

Difazio RL, Vessey JA, Zurakowski D, Snyder BD

Dev Med Child Neurol. 2016 Mar;58(3):298-305. doi: 10.1111/dmcn.12872. Ep ub 2015 Aug 24. Comment in Dev Med Child Neurol. 2016 Mar;58(3):226-7.

AIM: The aim of this study was to evaluate changes in caregivers' perceptions of health-related quality of life (HRQOL) and caregiver impact in children with severe, non-ambulatory cerebral palsy after orthopedic surgery to correct hip or spine deformities.

METHOD: A prospective longitudinal cohort study (n=44) design was used to measure changes before and after surgery. Caregivers completed the Caregiver Priorities and Child Health Index of Life with Disabilities (CPCHILD) and the Assessment of Caregiver Experience with Neuromuscular Disease (ACEND). Data collection was between February 2011 and February 2014. Caregivers were included if their child was 3 to 25 years old, had cerebral palsy in Gross Motor Function Classification System levels IV and V, and was scheduled for orthopedic surgery. Analysis of variance with repeated measures was used to assess changes before and at four time points after surgery.

RESULTS: Forty-four caregivers participated. Caregivers' perceptions of their child's HRQOL demonstrated an improvement from baseline to 12 months ($p<0.001$). Patients who had spine surgery demonstrated a steady improvement over time, whereas patients who had hip surgery had a decrease at 6 weeks followed by steady improvement. Improvements were noted in five of six of the CPCHILD domains, with no changes in the quality of life domain. No changes were noted in any of the ACEND domains.

INTERPRETATION: Caregivers report an improvement in a variety of domains of HRQOL 1 year after orthopedic surgery.

DOI: 10.1111/dmcn.12872

PMID: 26299261 [PubMed - indexed for MEDLINE]

Effect of Hip Reconstructive Surgery on Health-Related Quality of Life of Non-Ambulatory Children with Cerebral Palsy.

DiFazio R, Shore B, Vessey JA, Miller PE, Snyder BD

J Bone Joint Surg Am. 2016 Jul 20;98(14):1190-8. doi: 10.2106/JBJS.15.01063.

BACKGROUND: The primary aim of this study was to evaluate the relationship of the migration percentage (a radiographic metric quantifying hip displacement) in children with Gross Motor Function Classification System (GMFCS) level-IV or V cerebral palsy and spastic hip dysplasia to the acetabular index and the health-related quality of life (HRQOL) as measured with the Caregiver Priorities and Child Health Index of Life with Disabilities (CPCHILD) before and after reconstructive hip surgery.

METHODS: In a prospective cohort study (n = 38), the migration percentage, acetabular index, and CPCHILD scores were analyzed using the Pearson correlation analysis immediately before reconstructive hip surgery and at 6 weeks and 3, 6, 12, and 24 months after the surgery. Subgroup analysis was used to compare patients who had a preoperative migration percentage of ≥50% with those who had a preoperative migration percentage of <50% and to compare the acetabular index between patients who had a pelvic osteotomy and those who had not. Linear mixed models were used to analyze changes in the migration percentage, acetabular index, and CPCHILD scores over time.

RESULTS: The preoperative migration percentage negatively correlated with the preoperative CPCHILD score ($r = -0.50$; $p = 0.002$). This relationship continued throughout the follow-up period such that, for each additional 1% correction in migration percentage, the CPCHILD total score increased by 0.2 point ($p < 0.001$). There was no correlation between the acetabular index and CPCHILD total score before or after surgery ($p = 0.09$ to 0.71). The preoperative CPCHILD total scores differed between the migration-percentile groups (mean difference = 13 points; 95% confidence interval = 3.3 to 22.8; $p = 0.01$). However, after hip surgery, the CPCHILD score improved similarly for both groups.

CONCLUSIONS: These data support the effectiveness of reconstructive hip surgery for the treatment of spastic hip dysplasia to improve the HRQOL of non-ambulatory children with severe cerebral palsy.

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

DOI: 10.2106/JBJS.15.01063
PMID: 27440567 [PubMed - in process]

Excellent functional outcome following selective dorsal rhizotomy in a child with spasticity secondary to transverse myelitis.

Mazarakis NK, Ughratdar I, Vloeberghs MH

Childs Nerv Syst. 2015 Nov;31(11):2189-91. doi: 10.1007/s00381-015-2779-2. Epub 2015 Jun 16

PURPOSE: Selective dorsal rhizotomy (SDR) is a neurosurgical procedure used to treat spasticity in children with cerebral palsy (CP). The vast majority of studies to date suggest SDR is particularly effective in reducing lower limb spasticity in spastic diplegia with long-lasting effect.
METHOD: We report, to the best of our knowledge for the first time, the case of a teenager who underwent SDR for the management of spasticity secondary to transverse myelitis.
RESULTS: This is an unusual indication for SDR which resulted in completely loose lower limbs and an excellent functional outcome. At a follow-up 18 months following the procedure, the child had no re-occurrence of his symptoms.
CONCLUSION: This report raises the possibility that the use of SDR could be expanded to include other pathologies. We discuss the case and the relevant literature. Our spasticity service at NUH has to date inserted 300 baclofen pumps and performed 60 SDRs mainly in children with cerebral palsy.
DOI: 10.1007/s00381-015-2779-2
PMID: 26077594 [PubMed - indexed for MEDLINE]

Good outcome of total hip replacement in patients with cerebral palsy: A comparison of 389 patients and 425,813 controls from the National Joint Registry for England and Wales.

King G, Hunt LP, Wilkinson JM, Blom AW; National Joint Registry for England, Wales, and Northern Ireland.

Acta Orthop. 2016;87(2):93-9. doi: 10.3109/17453674.2015.1137439. Epub 2016 Feb10.

BACKGROUND AND PURPOSE: People with cerebral palsy (CP) often have painful deformed hips, but they are seldom treated with hip replacement as the surgery is considered to be high risk. However, few data are available on the outcome of hip replacement in these patients.
PATIENTS AND METHODS: We linked Hospital Episode Statistics (HES) records to the National Joint Registry for England and Wales to identify 389 patients with CP who had undergone hip replacement. Their treatment and outcomes were compared with those of 425,813 patients who did not have CP. Kaplan-Meier estimates were calculated to describe implant survivorship and the curves were compared using log-rank tests, with further stratification for age and implant type. Reasons for revision were quantified as patient-time incidence rates (PTIRs). Nationally collected patient-reported outcomes (PROMS) before and 6 months after operation were compared if available. Cumulative mortality (Kaplan-Meier) was estimated at 90 days and at 1, 3, and 5 years.
RESULTS: The cumulative probability of revision at 5 years post-surgery was 6.4% (95% CI: 3.8-11) in the CP cohort as opposed to 2.9% (CI 2.9-3%) in the non-CP cohort ($p < 0.001$). Patient-reported outcomes showed that CP patients had worse pain and function preoperatively, but had equivalent postoperative improvement. The median improvement in Oxford hip score at 6 months was 23 (IQR: 14-28) in CP and it was 21 (14-28) in non-CP patients. 91% of CP patients reported good or excellent satisfaction with their outcome. The cumulative probability of mortality for CP up to 7 years was similar to that in the controls after stratification for age and sex.
INTERPRETATION: Hip replacement for cerebral palsy appears to be safe and effective, although implant revision rates are higher than those in patients without cerebral palsy.
Free PMC Article
DOI: 10.3109/17453674.2015.1137439
PMCID: PMC4812090
PMID: 26863583 [PubMed - indexed for MEDLINE]

Management of Spinal Deformity in Adult Patients With Neuromuscular Disease.

Protopsaltis TS, Boniello AJ, Schwab FJ.

J Am Acad Orthop Surg. 2016 Jul 28. [Epub ahead of print]

A wide range of neuromuscular diseases, including Parkinson disease, cerebral palsy, multiple sclerosis, and myopathy, are associated with spinal deformities. The most common postural deformities include anterocollis, Pisa syndrome (pleurothotonus), scoliosis, and camptocormia. Nonsurgical management of spinal deformity in patients with neuromuscular disease centers on maximizing the medical management of the underlying neurodegenerative pathology before surgical intervention is contemplated. Surgical management can include decompression alone, or decompression and fusion with short or long fusion constructs. Patients with neuromuscular disease are susceptible to postoperative medical complications, such as delirium, epidural hematomas, pulmonary emboli, and cardiac events. Compared with outcomes in the typical patient with spinal deformity, postoperative outcomes in patients with neuromuscular disease have higher rates of surgical complications, such as instrumentation failure, proximal junctional kyphosis, loss of correction, and the need for revision surgery, regardless of the magnitude of surgical treatment.
DOI: 10.5435/JAAOS-D-15-00421
PMID: 27471900 [PubMed - as supplied by publisher]

Mid-term Results of Intramuscular Lengthening of Gastrocnemius and/or Soleus to Correct Equinus Deformity in Flatfoot.

Rong K, Ge WT, Li XC, Xu XY

Foot Ankle Int. 2015 Oct;36(10):1223-8. doi: 10.1177/1071100715588994. Epub 2015 Jun 3.

BACKGROUND: Intramuscular lengthening of the gastrocnemius and/or soleus (Baumann procedure) is widely used in patients who have cerebral palsy, with several advantages over other lengthening techniques. Tightness of the gastrocnemius or gastrocnemius-soleus complex has been confirmed to be related to flatfoot deformity. The purpose of this study was to evaluate the mid-term results of the Baumann procedure as a part of the treatment of flatfoot with equinus deformity.
METHODS: We reviewed 35 pediatric and adult patients (43 feet) with flatfoot who underwent the Baumann procedure for the concomitant equinus deformity. The mean duration of follow-up was 39.4 months. Preoperative and follow-up evaluations included the maximal angle of dorsiflexion of the ankle with the knee fully extended and with the knee flexed to 90 degrees, the American Orthopaedic Foot & Ankle Society ankle-hindfoot (AOFAS-AH) scores, and postoperative complications.
RESULTS: Preoperatively, the mean angle of passive ankle dorsiflexion with the knee extended was -4.7 ± 2.7 degrees and that with the knee flexed was 2.3 ± 2.5 degrees. At the final follow-up, both values improved significantly by a mean of 13.6 degrees ($P < .001$) and 9.7 degrees ($P < .001$), respectively. The average AOFAS-AH scores improved from 56.8 points preoperatively to 72.1 at the final follow-up. Recurrence of equinus was observed in 3 patients (4 feet). There were no cases of overcorrection, neurovascular injury, or healing problems.
CONCLUSIONS: Our results indicate that the Baumann procedure can effectively and sequentially correct the tightness of the gastrocnemius or the gastrocnemius-soleus complex in patients with flatfoot deformity, without obvious postoperative complications.
LEVEL OF EVIDENCE: Level IV, retrospective case series.

DOI: 10.1177/1071100715588994
PMID: 26041542 [PubMed - indexed for MEDLINE]

One Size Care Does Not Fit All Patients Undergoing a Spinal Fusion.

Rehabil Nurs. 2016 Jul 22. doi: 10.1002/rnj.292. [Epub ahead of print]

McMullan T

PURPOSE: Spinal fusion (SF) surgery is a complex procedure that affects children with and without underlying disabilities. The purpose of this article was to describe the necessary steps when preparing a child, specifically with cerebral palsy (CP), and family for a SF, while also emphasizing the postoperative care during discharge planning.
DESIGN: Literature review on pediatric patients undergoing spinal fusion and those who have cerebral palsy.
METHOD: Literature was searched using the CINAHL database, from 2009 to 2016. Key terms included: spinal fusion, cerebral palsy, pediatrics, orthopedic surgery, team approach, management and developmental disability, or

disability. Literature was reviewed to provide recommendations on caring for children undergoing a spinal fusion who also have cerebral palsy, as little literature supports exact care measures on this cohort of patients.
FINDINGS: Variations exist in the surgery type, specification, approach as well as in the history, growth, and developmental capabilities of the child and caregiver's expectations. Nurses must be aware of all of these factors to promote safe, effective, timely and patient-centered care. In particular, patients with an underlying condition of CP may be more likely to experience complications that make understanding these processes essential to the surgery itself.
CONCLUSIONS: Although a spinal fusion may be a necessary surgery to correct a curve or spine deformity, there are many complications that a child with cerebral palsy might encounter. The health care team must work closely with the child and the family to ensure that all treatment recommendations are met to minimize any unnecessary complications. Each surgery must focus specifically on meeting the child's and family's needs to ensure success while incorporating the health care team's approach.
CLINICAL RELEVANCE: Providing patient and family-centered care for children having a SF is essential to optimize outcomes and improve quality of life for patients and caregivers.

DOI: 10.1002/rnj.292
PMID: 27443575 [PubMed - as supplied by publisher]

Postoperative Complications After Hip Surgery in Patients With Cerebral Palsy: A Retrospective Matched Cohort Study.

DiFazio R, Vessey JA, Miller P, Van Nostrand K, Snyder B.
J Pediatr Orthop. 2016 Jan;36(1):56-62. doi: 10.1097/BPO.0000000000000404.

BACKGROUND: Little is known about the postoperative complications experienced by patients with severe cerebral palsy (CP) (GMFCS IV-V) compared with otherwise healthy patients with hip pathology requiring surgery. The purpose of this study was to determine whether differences exist between these 2 groups with respect to the incidence, type, and severity of complications. In addition, we evaluated the risk factors for complications and the number and cost of additional visits, hospital admissions, and repeat surgeries due to complications.
METHODS: Retrospective matched cohort study of 55 patients aged 3 to 25 years with severe CP and 55 non-CP patients with hip dysplasia who underwent hip osteotomies (2000 to 2012). Postoperative complications were evaluated using the adapted Clavien-Dindo classification system. Binary and ordinal logistic regressions were used to identify risk factors for complications. The number and cost of unplanned visits, admissions, and surgeries were calculated.
RESULTS: CP patients experienced almost twice as many complications as the non-CP patients (P=0.004). All types of complications occurred in both groups except orthopaedic complications (P<0.001) were more frequent in the non-CP group. CP patients were 82% more likely to develop a complication compared with non-CP patients (relative risk=1.82; 95% confidence interval=1.21 to 2.76). The severity of complications was comparable with no significant differences in the relative distribution between the groups. There was a significant difference between groups for the number of unplanned clinic and emergency department visits (P≤0.001). The average cost for treating a complication was $1857.00 for CP and $1800.00 for non-CP (P=0.72).
CONCLUSIONS: Although patients with severe CP requiring hip surgery have a 65% chance of experiencing at least 1 postoperative complication compared with 36% of non-CP patients, most of the complications were medical in the CP patients (n=46, 83%) as opposed to the non-CP patient who experienced predominantly orthopaedic complications (59%). When these complications occur the associated costs are greater for CP patients as a whole, but are relatively similar per patient.
LEVEL OF EVIDENCE: Level III—Prognostic, case-control study.
DOI: 10.1097/BPO.0000000000000404
PMID: 25633609 [PubMed - indexed for MEDLINE]

Principles of Tendon Transfer.

Wilbur D, Hammert WC
Hand Clin. 2016 Aug;32(3):283-9. doi: 10.1016/j.hcl.2016.03.001. Epub 2016 May 2.

Tendon transfers provide a substitute, either temporary or permanent, when function is lost due to neurologic injury in stroke, cerebral palsy or central nervous system lesions, peripheral nerve injuries, or injuries to the musculotendinous unit itself. This article reviews the basic principles of tendon transfer, which are important when planning surgery and essential for an optimal outcome. In addition, concepts for coapting the tendons during surgery and general principles to be followed during the rehabilitation process are discussed.

DOI: 10.1016/j.hcl.2016.03.001
PMID: 27387072 [PubMed - in process]

Superficialis Sling (Flexor Digitorum Superficialis Tenodesis) for Swan Neck Reconstruction.
Wei DH, Terrono AL
J Hand Surg Am. 2015 Oct;40(10):2068-74. doi: 10.1016/j.jhsa.2015.07.018. Epub 2015 Aug 29.

Swan neck deformity, or hyperextension of the proximal interphalangeal joint, may occur secondary to trauma, rheumatoid arthritis, cerebral palsy, or Ehlers-Danlos syndrome, and can be treated with tenodesis of one slip of the flexor digitorum sublimis tendon. This technique has several variations, differing primarily in the specific location and method that a single slip of the flexor digitorum sublimis tendon is secured, but they all serve to create a static volar restraint against hyperextension. Options include tunneling the tendon through the bone of the proximal phalanx, attaching the tendon to the A1 or A2 pulley, or securing the tendon with bone anchors in the proximal phalanx.

DOI: 10.1016/j.jhsa.2015.07.018
PMID: 26328902 [PubMed - indexed for MEDLINE]

Rectus femoris transfer surgery affects balance recovery in children with cerebral palsy: A computer simulation study.
Mansouri M, Clark AE, Seth A, Reinbolt JA
Gait Posture. 2016 Jan;43:24-30. doi: 10.1016/j.gaitpost.2015.08.016. Epub 2015 Oct 28.

Stiff-knee gait is a troublesome movement disorder among children with cerebral palsy (CP), where peak swing phase knee flexion is diminished due to over-activity of the rectus femoris muscle. A common treatment for stiff-knee gait, rectus femoris transfer surgery, moves the muscle's distal tendon from the patella to the sartorius insertion on the tibia. As a bia ticular muscle, rectus femoris may play a role in motor control and have unrecognized benefits for maintaining balance. We used musculoskeletal modeling, neuromuscular control, and forward dynamic simulation to investigate the role of rectus femoris tendon transfer surgery on balance recovery after support-surface perturbations for children with CP adopting two different crouched postures. We combined both high-level supraspinal and low-level spinal signals to generate 92 muscle excitations for tracking experimental whole body center of mass positions and velocities. Stability during balance recovery was evaluated by the minimum distance between the extrapolated center of mass and base of support boundary (bmin) and the minimum time to reach the boundary (TtBmin). The balance recovery of pre-surgical simulations (bmin=2.3+1.1cm, TtBmin=0.2+0.1s) were different (p=0.02), on average, than post-surgical simulations (bmin=-4.9+11.4cm, TtBmin=-0.1+0.3s) of rectus femoris transfers. The moderate crouch simulations (bmin=2.4+0.4cm, TtBmin=0.2+0.03s) were more stable than the mild crouch simulations (bmin=1.2+0.3cm, TtBmin=0.1+0.02s) following anterior translations of the support surface. These findings suggest that tendon transfer of rectus femoris affects balance recovery in children with CP.

DOI: 10.1016/j.gaitpost.2015.08.016
PMID: 26669947 [PubMed - indexed for MEDLINE]

Surgical responses and outcomes of bilateral lateral rectus recession in exotropia with cerebral palsy.
Ma DJ, Yang HK, Hwang JM
Acta Ophthalmol. 2016 Jul 16. doi: 10.1111/aos.13158. [Epub ahead of print]

PURPOSE: To determine surgical responses and outcomes of bilateral lateral rectus (BLR) recession in exotropes with cerebral palsy (CP) and to compare the results with exotropes without CP.

METHODS: Forty-one exotropes with CP and 82 age- and type (intermittent or constant)-matched exotropes without CP who underwent BLR recession by one surgeon (J-M.H.) were evaluated. Main outcome measures were surgical responses, factors affecting surgical response, success rates, cumulative probabilities of success and recurrence, and drifts of ocular alignment towards exodeviation after surgery (exodrift).
RESULTS: The surgical responses of BLR recession were not significantly different between both groups (p = 0.136). After a mean follow-up period of 2 years, success rates showed no significant difference between the two groups (p = 1.000). The cumulative probabilities of success and recurrence were not significantly different between the two groups (p = 0.770 and 0.754, respectively). The rate of recurrence per person-year during follow-up was 16.7% in patients with CP and 20.2% in patients without CP. The amount of exodrift showed no significant difference between both groups (p = 0.118).
CONCLUSIONS: Exotropes with CP showed a similar surgical response, an amount of exodrift, cumulative success and recurrence rates after BLR recession compared to exotropes without CP.

DOI: 10.1111/aos.13158
PMID: 27422358 [PubMed - as supplied by publisher]

The effectiveness of posterior knee capsulotomies and knee extension osteotomies in crouched gait in children with cerebral palsy.
Taylor D, Connor J, Church C, Lennon N, Henley J, Niiler T, Miller F.
J Pediatr Orthop B. 2016 Jul 7. [Epub ahead of print]

Crouched gait is common in children with cerebral palsy (CP), and there are various treatment options. This study evaluated the effectiveness of single-event multilevel surgery including posterior knee capsulotomy or distal femoral extension osteotomy to correct knee flexion contracture in children with CP. Gait analyses were carried out to evaluate gait preoperatively and postoperatively. Significant improvements were found in physical examination and kinematic measures, which showed that children with CP and crouched gait who develop knee flexion contractures can be treated effectively using single-event multilevel surgery including a posterior knee capsulotomy or distal femoral extension osteotomy.
DOI: 10.1097/BPB.0000000000000370
PMID: 27392300 [PubMed - as supplied by publisher]

Treatment of the Dislocated Hip in Infants With Spasticity.
Refakis CA, Baldwin KD, Spiegel DA, Sankar WN.
J Pediatr Orthop. 2016 Jul 2. [Epub ahead of print]

BACKGROUND: Although many studies have separately investigated the treatment of developmental dysplasia of the hip and spastic hip disease, little data exist regarding the treatment of infants with dislocated hips and underlying spasticity. The purpose of this study was to review our results after the surgical treatment of these infants.
METHODS: We retrospectively reviewed all children below 3 years of age who underwent hip reconstruction for dislocated hips in the setting of cerebral palsy or other spastic/high-tone neuromuscular disease. Medical records were reviewed for clinical data including treatment course, complications, and need for further surgery. Preoperative and postoperative radiographs were used to determine International Hip Dysplasia Institute (IHDI) grade of dislocation, acetabular index, migration percentage, and presence of avascular necrosis according to the Salter criteria.
RESULTS: Eleven patients with 15 hips met our inclusion criteria with a mean age of 20±8 (range, 6 to 34) months. Preoperatively, 12 of 15 hips (80%) were IHDI grade 4 and 3 of 15 (20%) were IHDI grade 3. Mean acetabular index was 29±8 (range, 19 to 46) degrees. Patients underwent open reduction (15 hips), adductor tenotomy (14 hips), femoral osteotomy (10 hips), and pelvic osteotomy (12 hips). At a mean follow-up of 40±16 (range, 13 to 71) months, 13 of 15 hips were IHDI grade 1 (86.7%), 1 was IHDI grade 2 (6.7%), and 1 hip was IHDI grade 3 (6.7%). The mean postoperative migration index was 7%±24% (range, -30% to 46%); the mean acetabular index was 22±8 (range, 9 to 38) degrees. No patients developed radiographically significant osteonecrosis. Complications included 2 femur fractures (13.3%) and 1 symptomatic implant that required early removal. One patient underwent further reconstructive hip surgery.

CONCLUSIONS: In this series of infants with hip dislocations and underlying spasticity, open reduction±pelvic osteotomy and/or femoral osteotomy has a nearly 90% success rate in achieving and maintaining adequate hip reduction at intermediate-term follow-up. In the unique population of infants with dislocated hips and underlying spasticity, comprehensive hip reconstruction is largely successful with an acceptable rate of complications.
LEVEL OF EVIDENCE: Level IV-retrospective.
DOI: 10.1097/BPO.0000000000000829
PMID: 27379781 [PubMed - as supplied by publisher]

Réadaptation fonctionnelle

Altered lower leg muscle activation patterns in patients with cerebral palsy during cycling on an ergometer.
Alves-Pinto A, Blumenstein T, Turova V, Lampe R.
Neuropsychiatr Dis Treat. 2016 Jun 17;12:1445-56. doi: 10.2147/NDT.S98260. eCollection 2016.

OBJECTIVE: Cycling on a recumbent ergometer constitutes one of the most popular rehabilitation exercises in cerebral palsy (CP). However, no control is performed on how muscles are being used during training. Given that patients with CP present altered muscular activity patterns during cycling or walking, it is possible that an incorrect pattern of muscle activation is being promoted during rehabilitation cycling. This study investigated patterns of muscular activation during cycling on a recumbent ergometer in patients with CP and whether those patterns are determined by the degree of spasticity and of mobility.
METHODS: Electromyographic (EMG) recordings of lower leg muscle activation during cycling on a recumbent ergometer were performed in 14 adult patients diagnosed with CP and five adult healthy participants. EMG recordings were done with an eight-channel EMG system built in the laboratory. The activity of the following muscles was recorded: Musculus rectus femoris, Musculus biceps femoris, Musculus tibialis anterior, and Musculus gastrocnemius. The degree of muscle spasticity and mobility was assessed using the Modified Ashworth Scale and the Gross Motor Function Classification System, respectively. Muscle activation patterns were described in terms of onset and duration of activation as well as duration of cocontractions.
RESULTS: Muscle activation in CP was characterized by earlier onsets, longer periods of activation, a higher occurrence of agonist-antagonist cocontractions, and a more variable cycling tempo in comparison to healthy participants. The degree of altered muscle activation pattern correlated significantly with the degree of spasticity.
CONCLUSION: This study confirmed the occurrence of altered lower leg muscle activation patterns in patients with CP during cycling on a recumbent ergometer. There is a need to develop feedback systems that can inform patients and therapists of an incorrect muscle activation during cycling and support the training of a more physiological activation pattern.
Free PMC Article
DOI: 10.2147/NDT.S98260
PMCID: PMC4918804
PMID: 27382287 [PubMed

Changes in Mobility and Muscle Function of Children With Cerebral Palsy After Gait Training: A Pilot Study.
Hegarty AK, Kurz MJ, Stuberg W, Silverman AK.
J Appl Biomech. 2016 Jun 24. [Epub ahead of print]

The goal of this pilot study was to characterize the effects of gait training on the capacity of muscles to produce body accelerations, and relate these changes to mobility improvements seen in children with cerebral palsy (CP). Five children (14 years ± 3 years; GMFCS I-II) with spastic diplegic CP participated in a six-week gait training program. Changes in the fast-as-possible walking speed and 6-minute walking endurance were used to assess changes in activity levels. In addition, musculoskeletal modeling was used to determine the potential of lower-limb muscular function to accelerate the body's center of mass vertically and forward during stance. The mobility changes after the training were mixed with some children demonstrating vast improvements, while others appeared to be minimal. However, the musculoskeletal results revealed unique responses for each child. The most common changes occurred in the capacity for the hip and knee extensors to produce body support and the hip flexors to produce body propulsion. These results cannot yet be generalized to the broad population of children with CP, but demonstrate

that therapy protocols may be enhanced by modeling analyses. The pilot study results provide motivation for gait training emphasizing upright leg posture, mediolateral balance and ankle push-off.
DOI: 10.1123/jab.2015-0311
PMID: 27348240 [PubMed - as supplied by publisher]

Clinical usefulness of Adeli suit therapy for improving gait function in children with spastic cerebral palsy: a case study.
Lee BH
J Phys Ther Sci. 2016 Jun;28(6):1949-52. doi: 10.1589/jpts.28.1949. Epub 2016 Jun 28.

[Purpose] The purpose of this study was to determine the effects of Adeli suit therapy (AST) on gross motor function and gait function in children with cerebral palsy.
[Subjects and Methods] Two participants with spastic cerebral palsy were recruited to undergo AST. AST was applied in 60-minute sessions, five times per week, with 20 sessions total over 4 weeks. Assessments of gross motor function, spatiotemporal parameters, and functional ambulation performance for gait were conducted.
[Results] Gross motor function, cadence, and functional ambulation performance improved after the intervention in both cases.
[Conclusion] Although additional follow-up studies are required, the results demonstrated improved gross motor function and functional ambulation performance in the children with cerebral palsy. These findings suggest a variety of applications for conservative therapeutic methods that require future clinical trials in children with cerebral palsy.
Free PMC Article
DOI: 10.1589/jpts.28.1949
PMCID: PMC4932094
PMID: 27390453 [PubMed

Effect of physical therapy frequency on gross motor function in children with cerebral palsy.
Park EY
J Phys Ther Sci. 2016 Jun;28(6):1888-91. doi: 10.1589/jpts.28.1888. Epub 2016 Jun 28.

[Purpose] This study attempted to investigate the effect of physical therapy frequency based on neurodevelopmental therapy on gross motor function in children with cerebral palsy. [Subjects and Methods] The study sample included 161 children with cerebral palsy who attended a convalescent or rehabilitation center for disabled individuals or a special school for children with physical disabilities in South Korea. Gross Motor Function Measure data were collected according to physical therapy frequency based on neurodevelopmental therapy for a period of 1 year. [Results] The correlation between physical therapy frequency and Gross Motor Function Measure scores for crawling and kneeling, standing, walking, running and jumping, and rolling, and the Gross Motor Function Measure total score was significant. The differences in gross motor function according to physical therapy frequency were significant for crawling, kneeling, standing, and Gross Motor Function Measure total score. The differences in gross motor function according to frequency of physical therapy were significant for standing in Gross Motor Function Classification System Level V. [Conclusion] Intensive physical therapy was more effective for improving gross motor function in children with cerebral palsy. In particular, crawling and kneeling, and standing ability showed greater increases with intensive physical therapy.
Free PMC Article
DOI: 10.1589/jpts.28.1888
PMCID: PMC4932081
PMID: 27390440 [PubMed]

Effect of Rhythmic Auditory Stimulation on Hemiplegic Gait Patterns.
Shin YK, Chong HJ, Kim SJ, Cho SR
Yonsei Med J. 2015 Nov;56(6):1703-13. doi: 10.3349/ymj.2015.56.6.1703.

PURPOSE: The purpose of our study was to investigate the effect of gait training with rhythmic auditory stimulation (RAS) on both kinematic and temporospatial gait patterns in patients with hemiplegia.

MATERIALS AND METHODS: Eighteen hemiplegic patients diagnosed with either cerebral palsy or stroke participated in this study. All participants underwent the 4-week gait training with RAS. The treatment was performed for 30 minutes per each session, three sessions per week. RAS was provided with rhythmic beats using a chord progression on a keyboard. Kinematic and temporospatial data were collected and analyzed using a three-dimensional motion analysis system.
RESULTS: Gait training with RAS significantly improved both proximal and distal joint kinematic patterns in hip adduction, knee flexion, and ankle plantar flexion, enhancing the gait deviation index (GDI) as well as ameliorating temporal asymmetry of the stance and swing phases in patients with hemiplegia. Stroke patients with previous walking experience demonstrated significant kinematic improvement in knee flexion in mid-swing and ankle dorsiflexion in terminal stance. Among stroke patients, subacute patients showed a significantly increased GDI score compared with chronic patients. In addition, household ambulators showed a significant effect on reducing anterior tilt of the pelvis with an enhanced GDI score, while community ambulators significantly increased knee flexion in mid-swing phase and ankle dorsiflexion in terminal stance phase.
CONCLUSION: Gait training with RAS has beneficial effects on both kinematic and temporospatial patterns in patients with hemiplegia, providing not only clinical implications of locomotor rehabilitation with goal-oriented external feedback using RAS but also differential effects according to ambulatory function.
Free PMC Article
DOI: 10.3349/ymj.2015.56.6.1703
PMCID: PMC4630063
PMID: 26446657 [PubMed - indexed for MEDLINE]

Effectiveness of backward walking training on walking ability in children with hemiparetic cerebral palsy: A randomized controlled trial.
Abdel-Aziem AA, El-Basatiny HM
Clin Rehabil. 2016 Jun 29. pii: 0269215516656468. [Epub ahead of print

OBJECTIVE: To compare the effects of backward walking training and forward walking training on spatiotemporal gait parameters, and gross motor function measures in children with cerebral palsy.
DESIGN: Randomized controlled clinical trial.
SETTING: Physical therapy clinics.
SUBJECTS: A total of 30 children with hemiparetic cerebral palsy of both sexes (10 to 14 years of age, classified as I or II by gross motor function classification system) participated in this study. They were randomly assigned into two equal groups.
INTERVENTIONS: Both groups received a conventional physical therapy program for 12 successive weeks (three sessions per week). The experimental group additionally received (25 min) backward walking training. The control group additionally received (25 min) forward walking training.
OUTCOME MEASURES: Baseline, posttreatment, and follow-up assessment for spatiotemporal gait parameters and gross motor functions were evaluated by using three dimensional gait analysis system and gross motor function measures.
RESULTS: There was a significant improvement in step length, walking velocity, cadence, stance phase, and swing phase percentage and gross motor function measures (Dimensions D and E) of the experimental group (0.55 ±0.16, 0.53 ±0.19, 121.73 ±2.89, 54.73 ±1.67, 44.40 ±1.40, 90.20 ±6.44, 82.47 ±12.82), respectively, than the control group (0.39 ±0.13, 0.46 ±0.20, 125.80 ±2.96, 50.27 ±1.62, 49.47 ±1.55, 82.47 ±7.05, 80.47 ±12.61), respectively, ($p < 0.05$). The significant improvement of all measured outcomes of the experimental group was maintained at 1 month follow-up assessment ($p < 0.05$).
CONCLUSION: In addition to a conventional physical therapy program, backward walking training is more effective than forward walking training on spatiotemporal gait parameters, and gross motor function measures in children with hemiparetic cerebral palsy.

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PMID: 27356944 [PubMed - as supplied by publisher]

Impact of loaded sit-to-stand exercises at different speeds on the physiological cost of walking in children with spastic diplegia: A single-blind randomized clinical trial.
Kusumoto Y, Nitta O, Takaki K
Res Dev Disabil. 2016 Jul 7;57:85-91. doi: 10.1016/j.ridd.2016.06.006. [Epub ahead of print]

PURPOSE: In the present study, we aimed to determine whether similarly loaded sit-to-stand exercises at different speeds improve the physiological cost of walking in children with spastic diplegia.
METHODS: This design was a single-blind randomized clinical trial. Sixteen children with cerebral palsy (CP), aged 12-18 years, with a diagnosis of spastic diplegia, were randomly allocated to a slow loaded sit-to-stand exercise group (n=8) and a self-paced loaded sit-to-stand exercise group (n=8). Loaded sit-to-stand exercise was conducted at home for 15min, 4 sets per day, 3-4days per week, for 6 weeks. The patients were evaluated immediately before the intervention and after the training. Lower limb muscle strength using a hand-held dynamometer, selective voluntary motor control using SCALE, 6-min walk distance (6MWD), and Physiological Cost Index (PCI) were measured.
RESULTS: The 6MWD showed a significant difference before and after intervention. PCI showed a significant difference between the two groups and the two time points. 6MWD and the PCI improved after intervention in the slow sit-to-stand exercise group.
CONCLUSIONS: Compared to loaded sit-to-stand exercise at a regular speed, slow low-loaded sit-to-stand exercise improved the 6MWD and PCI in children with CP, suggesting that this decrease in speed during exercise improves the physiological cost of walking in these children.

DOI: 10.1016/j.ridd.2016.06.006
PMID: 27394691 [PubMed - as supplied by publisher]

Kinetic comparison of walking on a treadmill versus over ground in children with cerebral palsy.
van der Krogt MM, Sloot LH, Buizer AI, Harlaar J.
J Biomech. 2015 Oct 15;48(13):3577-83. doi: 10.1016/j.jbiomech.2015.07.046. Epub 2015 Aug 14.

Kinetic outcomes are an essential part of clinical gait analysis, and can be collected for many consecutive strides using instrumented treadmills. However, the validity of treadmill kinetic outcomes has not been demonstrated for children with cerebral palsy (CP). In this study we compared ground reaction forces (GRF), center of pressure, and hip, knee and ankle moments, powers and work, between overground (OG) and self-paced treadmill (TM) walking for 11 typically developing (TD) children and 9 children with spastic CP. Considerable differences were found in several outcome parameters. In TM, subjects demonstrated lower ankle power generation and more absorption, and increased hip moments and work. This shift from ankle to hip strategy was likely due to a more backward positioning of the hip and a slightly more forward trunk lean. In mediolateral direction, GRF and hip and knee joint moments were increased in TM due to wider step width. These findings indicate that kinetic data collected on a TM cannot be readily compared with OG data in TD children and children with CP, and that treadmill-specific normative data sets should be used when performing kinetic gait analysis on a treadmill.

DOI: 10.1016/j.jbiomech.2015.07.046
PMID: 26315918 [PubMed - indexed for MEDLINE]

Motorized versus manual instrumented spasticity assessment in children with cerebral palsy.
Sloot LH, Bar-On L, van der Krogt MM, Aertbeliën E, Buizer AI, Desloovere K, Harlaar J
Dev Med Child Neurol. 2016 Jul 1. doi: 10.1111/dmcn.13194. [Epub ahead of print]

AIM: We compared the outcomes of manual and motorized instrumented ankle spasticity assessments in children with cerebral palsy (CP).
METHOD: Ten children with spastic CP (three males, seven females; mean age 11y [standard deviation 3y], range 6-14y; Gross Motor Function Classification System levels I-III) were included. During motorized assessments, fast (100°/s) rotations were imposed around the ankle joint by a motor-driven footplate; during manual assessments, rotations of comparable speed were applied by a therapist using a foot orthotic. Angular range of motion, maximum velocity, acceleration, work, and muscle activity (electromyography [EMG]) of the triceps surae and tibialis anterior

were compared during passive muscle stretch between motorized and manual assessments. Both movement profiles were also compared to CP gait ankle movement profile.
RESULTS: The imposed movement profile differed between methods, with the motorized assessment reaching higher maximum acceleration. Despite equal maximum velocity, the triceps surae were more often activated in motorized assessments, with low agreement of 44% to 72% (κ≤0) for EMG onset occurrence between methods.
The manually applied ankle velocity profile matched more closely with the gait profile.
INTERPRETATION: The differences in acceleration possibly account for the different muscle responses, which may suggest acceleration, rather than velocity-dependency of the stretch reflex. Future prototypes of instrumented spasticity assessments should standardize movement profiles, preferably by developing profiles that mimic functional tasks such as walking.

DOI: 10.1111/dmcn.13194
PMID: 27363603 [PubMed - as supplied by publisher]

Outcomes of gait trainer use in home and school settings for children with motor impairments: a systematic review.

Paleg G, Livingstone R

Clin Rehabil. 2015 Nov;29(11):1077-91. doi: 10.1177/0269215514565947. Epub 2015 Jan 30.

OBJECTIVE: To summarize and critically appraise evidence regarding use of gait trainers (walkers providing trunk and pelvic support) at home or school with children who are unable to walk independently or with hand-held walkers.
DATA SOURCES: Searches were performed in seven electronic databases including EBM Reviews, CINAHL, Medline and EMBASE for publications in English from database inception to November 2014.
REVIEW METHODS: Included studies involved at least one child with a mobility limitation and measured an outcome related to gait trainer use. Articles were appraised using American Academy of Cerebral Palsy and Developmental Medicine criteria for group and single-subject designs and quality ratings completed for studies rated levels I-III. The PRISMA statement was followed with inclusion criteria set a priori. Two reviewers independently screened titles, abstracts and full-text articles.
RESULTS: Seventeen studies involving 182 children were included. Evidence from one small randomized controlled trial suggests a non-significant trend toward increased walking distance while the other evidence level II study (concurrent multiple baseline design) reports increased number of steps. Two level III studies (non-randomized two-group studies) report statistically significant impact on mobility level with one finding significant impact on bowel function and an association between increased intervention time and bone mineral density. Remaining descriptive level evidence provides support for positive impact on a range of activity outcomes, with some studies reporting impact on affect, motivation and participation with others.
CONCLUSIONS: Evidence supporting outcomes for children using gait trainers is primarily descriptive and, while mainly positive, is insufficient to draw firm conclusions.

DOI: 10.1177/0269215514565947
PMID: 25636993 [PubMed - indexed for MEDLINE]

Over ground walking and body weight supported walking improve mobility equally in cerebral palsy: a randomised controlled trial.

Swe NN, Sendhilnnathan S, van Den Berg M, Barr C

C*lin Rehabil. 2015 Nov;29(11):1108-16. doi: 10.1177/0269215514566249. Epub 2015 Jan 30.*

OBJECTIVE: To assess partial body weight supported treadmill training versus over ground training for walking ability in children with mild to moderate cerebral palsy.
DESIGN: Randomised controlled trial.
SETTING: A Special Needs school in Singapore.
SUBJECTS: Thirty children with cerebral palsy, aged 6-18, with a Gross Motor Function Classification System score of II-III.

INTERVENTIONS: Two times 30 minute sessions of walking training per week for 8 weeks, progressed as tolerated, either over ground (control) or using partial body weight supported treadmill training (intervention).
MAIN MEASURES: The 10 metre walk test, and the 6 minute walk test. Secondary measures were sub-sections D and E on the Gross Motor Function Measure. Outcomes were assessed at baseline, and after 4 and 8 weeks of training.
RESULTS: There was no effect of group allocation on any outcome measure, while time was a significant factor for all outcomes. Walking speed improved significantly more in the intervention group by week 4 (0.109 (0.067)m/s vs 0.048 (0.071)m/s, P=0.024) however by week 8 the change from baseline was similar (intervention 0.0160 (0.069)m/s vs control 0.173 (0.109)m/s, P=0.697). All gains made by week 4 were significantly improved on by week 8 for the 10 metre walk test, 6 minute walk test, and the gross motor function measure.
CONCLUSIONS: Partial body weight supported treadmill training is no more effective than over ground walking at improving aspects of walking and function in children with mild to moderate cerebral palsy. Gains seen in 4 weeks can be furthered by 8 weeks.

DOI: 10.1177/0269215514566249
PMID: 25636992 [PubMed - indexed for MEDLINE]

Quantifying passive muscle stiffness in children with and without cerebral palsy using ultrasound shear wave elastography.

Brandenburg JE, Eby SF, Song P, Kingsley-Berg S, Bamlet W, Sieck GC, An KN
Dev Med Child Neurol. 2016 Jul 4. doi: 10.1111/dmcn.13179. [Epub ahead of print]

AIM: The aim of this study was to compare passive muscle stiffness in children with cerebral palsy (CP) and children with typical development using a novel ultrasound technique: ultrasound shear wave elastography (SWE).
METHOD: We conducted a prospective study of 13 children with CP (six females and seven males, median age 5y 1mo [interquartile range 4y 4mo-7y 8mo]) and 13 children with typical development (six females and seven males, median age 5y 3mo [interquartile range 4y 4mo-9y 4mo]). Demographic information and physical exam measurements were obtained in addition to shear modulus measurements (passive muscle stiffness) of the lateral gastrocnemius muscle at 20° plantar flexion, 10° plantar flexion, and 0° plantar flexion using SWE.
RESULTS: Children with CP had significantly greater shear modulus measurements at all three foot positions ($p<0.050$). When the shear modulus values were normalized to the baseline value for each child, there was no significant difference between the two groups.
INTERPRETATION: Passive muscle stiffness, measured without the influence of spasticity, is greater in children with CP than in children with typical development when a muscle is at slack and at stretch. When shear modulus was normalized, the results indicate that muscle in children in both groups responds similarly to passive stretch. Further work includes evaluating effect of botulinum toxin on passive muscle properties.

DOI: 10.1111/dmcn.13179
PMID: 27374483 [PubMed - as supplied by publisher]

Relation of selective voluntary motor control of the lower extremity and extensor strength of the knee joint in children with spastic diplegia.

Kusumoto Y, Takaki K, Matsuda T, Nitta O
J Phys Ther Sci. 2016 Jun;28(6):1868-71. doi: 10.1589/jpts.28.1868. Epub 2016 Jun 28.

[Purpose] The aim of this study was to investigate differences in selective voluntary motor control of the lower extremities by objective assessment and determine the relationship between selective voluntary motor control and knee extensor strength in children with spastic diplegia.
[Subjects and Methods] Forty individuals who had spastic cerebral palsy, with Gross Motor Function Classification System levels ranging from I to III, were assessed using the Selective Control Assessment of the Lower Extremity and by testing the maximum knee extensor strength. The unaffected side was defined as the lower limb with the higher score, and the affected side was defined as the lower limb with the lower score. [Results] The Selective Control Assessment of the Lower Extremity score on the affected side had a lower average than that on the unaffected side. The scores showed a significant inverse correlation with the maximum knee extensor strength. [Conclusion] There was bilateral difference in the selective voluntary motor control of the lower extremities in children with spastic

diplegia, and the selective voluntary motor control of the lower extremity was related to maximum knee extensor strength.

Free PMC Article

DOI: 10.1589/jpts.28.1868
PMCID: PMC4932077
PMID: 27390436 [PubMed]

The Influence of Neurodevelopmental Treatment on Transforming Growth Factor-β1 Levels and Neurological Remodeling in Children With Cerebral Palsy.

Tao W, Lu Z, Wen F

J Child Neurol. 2016 Jun 30. pii: 0883073816656402. [Epub ahead of print]

Neurodevelopmental treatment is an advanced therapeutic approach for the neural rehabilitation of children with cerebral palsy. Cerebral palsy represents a spectrum of neurological disorders primarily affecting gross motor function. The authors investigated the effects of neurodevelopmental treatment on serum levels of transforming growth factor-β1 (TGF-β1), a neuroprotective cytokine, and improvements to motor skills. Serum TGF-β1 levels and total score of the Gross Motor Function Measure-88 (GMFM-88) were significantly higher in children with cerebral palsy who underwent neurodevelopmental treatment compared to untreated patients ($P < .01$). Furthermore, the improved GMFM-88 total scores after neurodevelopmental treatment were significantly higher in children under the age of 3 with cerebral palsy than in older patients ($P < .01$). The authors demonstrate that the integration of TGF-β1 levels and GMFM-88 total score could be used to assess the efficacy of neurodevelopmental treatment. Moreover, the findings provide further scientific support for the early intervention and neurological rehabilitation of young children with cerebral palsy.

DOI: 10.1177/0883073816656402
PMID: 27364738 [PubMed - as supplied by publisher]

The impact of strength training on skeletal muscle morphology and architecture in children and adolescents with spastic cerebral palsy: A systematic review.

illett JG, Boyd RN, Carty CP, Barber LA

Res Dev Disabil. 2016 Sep;56:183-96. doi: 10.1016/j.ridd.2016.06.003.

AIM: The aim of this study was to systematically review the current literature to determine the impact of strength training on skeletal muscle morphology and architecture in individuals aged 4-20 years with spastic type cerebral palsy.

METHODS: A comprehensive search for randomised and non-randomised controlled trials, cohort studies and cross-comparison trials was performed on five electronic databases. Included studies were graded according to level of evidence and assessed for methodological quality using the Downs and Black scale. Quantitative data was analysed using effect sizes.

RESULTS: Six of 304 articles met the inclusion criteria. Methodological quality of the included papers ranged from 14 to 19 (out of 32). A large effect was found on muscle cross-sectional area following strength training, with small to moderate effects on muscle volume and thickness.

CONCLUSION AND IMPLICATIONS: There is preliminary evidence that strength training leads to hypertrophy in children and adolescents with CP. A paucity of studies exist measuring morphological and architectural parameters following strength training in these individuals. Overall low study methodological quality along with heterogeneous study design, dissimilar outcome measures, and lack of adequate control groups, indicated that care is needed when interpreting the results of these studies in isolation.

DOI: 10.1016/j.ridd.2016.06.003
PMID: 27337690 [PubMed - in process]

The orthotic and therapeutic effects following daily community applied functional electrical stimulation in children with unilateral spastic cerebral palsy: a randomised controlled trial.

Pool D, Valentine J, Bear N, Donnelly CJ, Elliott C, Stannage K

BMC Pediatr. 2015 Oct 12;15:154. doi: 10.1186/s12887-015-0472-y.

BACKGROUND: The purpose of this study was to determine the orthotic and therapeutic effects of daily community applied FES to the ankle dorsiflexors in a randomized controlled trial. We hypothesized that children receiving the eight-week FES treatment would demonstrate orthotic and therapeutic effects in gait and spasticity as well as better community mobility and balance skills compared to controls not receiving FES.

METHODS: This randomized controlled trial involved 32 children (mean age 10 yrs 3 mo, SD 3 yrs 3 mo; 15 females, 17 males) with unilateral spastic cerebral palsy and a Gross Motor Function Classification System of I or II randomly assigned to a FES treatment group (n = 16) or control group (n = 16). The treatment group received eight weeks of daily FES (four hours per day, six days per week) and the control group received usual orthotic and therapy treatment. Children were assessed at baseline, post FES treatment (eight weeks) and follow-up (six weeks after post FES treatment). Outcome measures included lower limb gait mechanics, clinical measures of gastrocnemius spasticity and community mobility balance skills.

RESULTS: Participants used the FES for a mean daily use of 6.2 (SD 3.2) hours over the eight-week intervention period. With FES, the treatment group demonstrated a significant ($p < 0.05$) increase in initial contact ankle angle (mean difference 11.9° 95% CI 6.8° to 17.1°), maximum dorsiflexion ankle angle in swing (mean difference 8.1° 95% CI 1.8° to 14.4°) normalized time in stance (mean difference 0.27 95% CI 0.05 to 0.49) and normalized step length (mean difference 0.06 95% CI 0.003 to 0.126) post treatment compared to the control group. Without FES, the treatment group significantly increased community mobility balance scores at post treatment (mean difference 8.3 units 95% CI 3.2 to 13.4 units) and at follow-up (mean difference 8.9 units 95% CI 3.8 to 13.9 units) compared to the control group. The treatment group also had significantly reduced gastrocnemius spasticity at post treatment ($p = 0.038$) and at follow-up (dynamic range of motion mean difference 6.9°, 95% CI 0.4° to 13.6°; $p = 0.035$) compared to the control group.

CONCLUSION: This study documents an orthotic effect with improvement in lower limb mechanics during gait. Therapeutic effects i.e. without FES were observed in clinical measures of gastrocnemius spasticity, community mobility and balance skills in the treatment group at post treatment and follow-up. This study supports the use of FES applied during daily walking activities to improve gait mechanics as well as to address community mobility issues among children with unilateral spastic cerebral palsy.

TRIAL REGISTRATION: Australian New Zealand Clinical Trials Register
ACTRN12614000949684 . Registered 4 September 2014.

Free PMC Article

DOI: 10.1186/s12887-015-0472-y
PMCID: PMC4603297
PMID: 26459358 [PubMed - indexed for MEDLINE]

The safety and feasibility of an intervention to improve balance dysfunction in ambulant adults with cerebral palsy: a pilot randomized controlled trial.

Morgan P, Murphy A, Opheim A, Pogrebnoy D, Kravtsov S, McGinley J.

Clin Rehabil. 2015 Sep;29(9):907-19. doi: 10.1177/0269215514556299. Epub 2014 Nov 20.

OBJECTIVE: To investigate the safety, feasibility and potential efficacy of balance training in adults with cerebral palsy.

DESIGN: Phase 2, assessor-blinded randomized controlled trial.

SETTING: Outpatient rehabilitation facility.

SUBJECTS: A total of 17 ambulatory adults with cerebral palsy.

INTERVENTIONS: Participants were randomly allocated to an eight-week, once-weekly, small group programme of balance training, or seated attention control activity. Balance training was individually tailored using the Balance Evaluation Systems test.

MAIN MEASURES: Primary focus was feasibility, addressed by recruitment, retention, adherence, and safety. Efficacy was primarily evaluated with the Ambulatory Self-Confidence Questionnaire and the Balance Evaluation Systems

test, at intervention conclusion and Week 24. Secondary outcomes included gait speed, walking distance, falls efficacy, fatigue, quality of life, and global impression of change.
RESULTS: Interventions were safe and feasible with no major adverse events. Adherence was high. At eight and 24 weeks, there were negligible between-group differences in Balance Evaluation systems test total. At 24 weeks, there was a small, non-significant between-group difference in favour of the balance group with effect sizes of 0.14 for ambulatory self-confidence, 0.10 for falls efficacy, and 0.12 for fatigue. There were significant between-group differences for self-reported walking confidence and balance change, in favour of the balance group at Weeks 8 and 24 ($p < 0.05$).
CONCLUSION: A customised balance programme is feasible and safe for ambulant adults with cerebral palsy. Small effects from balance training in selected outcomes occurred. Study replication with at least 38 participants per group to confirm efficacy is warranted.

DOI: 10.1177/0269215514556299
PMID: 25413169 [PubMed - indexed for MEDLINE]

The Sarah evaluation scale for children and adolescents with cerebral palsy: description and results.
Pinto KS, Carvalho CG, Nakamoto L, Nunes LG
Braz J Phys Ther. 2016 Mar 22;20(3):267-74. doi: 10.1590/bjpt-rbf.2014.0156.

BACKGROUND: Assessments of motor-functional aspects in cerebral palsy are crucial to rehabilitation programs.
OBJECTIVE: To introduce the Sarah motor-functional evaluation scale and to report the initial results of its measurement properties. This scale was created based on the experience of the Sarah Network of Rehabilitation Hospitals in the care of children and adolescents with cerebral palsy.
METHOD: Preliminary results concerning the measurement properties of the scale were obtained via assessment of 76 children and adolescents with cerebral palsy. Experts' opinions were used to determine an expected empirical score by age group and to differentiate severity levels.
RESULTS: The scale exhibited a high Cronbach's alpha coefficient (0.95). Strong correlation was observed with experts' classification for severity levels (0.81 to 0.97) and with the scales Gross Motor Function Measure and Pediatric Evaluation of Disability Inventory (0.80 to 0.98). Regression analysis detected a significant relationship between the scale score and the severity of the child's motor impairment. The inter-rater reliability was also strong (intraclass correlation coefficient ranging from 0.98 to 0.99). The internal responsiveness of the scale score was confirmed by significant differences between longitudinal evaluations (paired Student's t test with $p<0.01$; standardized response mean of 0.60).
CONCLUSION: The Sarah scale provides a valid measure for assessing the motor skills and functional performance of children and adolescents with cerebral palsy. The preliminary results showed that the Sarah scale has potential for use in routine clinical practice and rehabilitation units.
Free Article
DOI: 10.1590/bjpt-rbf.2014.0156
PMID: 27437718 [PubMed - in process]

Wide-pulse-high-frequency neuromuscular electrical stimulation in cerebral palsy.
Neyroud D, Armand S, De Coulon G, Da Silva SR, Wegrzyk J, Gondin J, Kayser B, Place N
Clin Neurophysiol. 2016 Feb;127(2):1530-9. doi: 10.1016/j.clinph.2015.07.009. Epub 2015 Jul 17.

OBJECTIVE: The present study assesses whether wide-pulse-high-frequency (WPHF) neuromuscular electrical stimulation (NMES) could result in extra-force production in cerebral palsy (CP) patients as previously observed in healthy individuals.
METHODS: Ten CP and 10 age- and sex-matched control participants underwent plantar flexors NMES. Two to three 10-s WPHF (frequency: 100 Hz, pulse duration: 1 ms) and conventional (CONV, frequency 25 Hz, pulse duration: 50 μs) trains as well as two to three burst-like stimulation trains (2s at 25 Hz, 2s at 100 Hz, 2s at 25 Hz; pulse duration: 1 ms) were evoked. Resting soleus and gastrocnemii maximal H-reflex amplitude (Hmax) was normalized by maximal M-wave amplitude (Mmax) to quantify α-motoneuron modulation.
RESULTS: Similar Hmax/Mmax ratio was found in CP and control participants. Extra-force generation was observed both in CP (+18 ± 74%) and control individuals (+94 ± 124%) during WPHF ($p<0.05$). Similar extra-forces were found

during burst-like stimulations in both groups (+108 ± 110% in CP and +65 ± 85% in controls, p>0.05).
CONCLUSION: Although the mechanisms underlying extra-force production may differ between WPHF and burst-like NMES, similar increases were observed in patients with CP and healthy controls.
SIGNIFICANCE: Development of extra-forces in response to WPHF NMES evoked at low stimulation intensity might open new possibilities in neuromuscular rehabilitation.

DOI: 10.1016/j.clinph.2015.07.009
PMID: 26232132 [PubMed - indexed for MEDLINE]

Orthèses

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Influence of orthosis on the foot progression angle in children with spastic cerebral palsy.
Danino B, Erel S, Kfir M, Khamis S, Batt R, Hemo Y, Wientroub S, Hayek S.
Gait Posture. 2015 Oct;42(4):518-22. doi: 10.1016/j.gaitpost.2015.08.006. Epub 2015 Aug 28

We retrospectively assessed the effect of ankle-foot orthosis (AFO) on the foot progression angle (FPA) of 97 children with spastic cerebral palsy (CP) who had undergone comprehensive computer-based gait analysis both barefoot and with their orthosis, during the same session. The physical examination results and the gait study temporal and kinematic parameters comprise the study data. We focused on the peak FPA reached during stance and swing phases and at mid-stance and mid-swing, and also measured the transverse rotations of the pelvis, the femur and the tibia. AFOs improved gait, as reflected by improved temporal parameters, but they also increased internal rotation of the feet in diplegic CP children by 4.29 degrees for mid-stance, and by 3.72 degrees for mid-swing. The correlation between components of the rotational profile and FPA was significant for the diplegic group. AFOs did not produce any noteworthy differences between walking barefoot and walking with the brace in the hemiplegic group in what concerns FPA. Children with diplegic CP who use AFOs walk with increased internal FPAs in their orthoses. These findings might be explained by anatomical attributes as well as dynamic features during gait.

DOI: 10.1016/j.gaitpost.2015.08.006
PMID: 26371829 [PubMed - indexed for MEDLINE]

Research of the spatial-temporal gait parameters and pressure characteristic in spastic diplegia children.
Pauk J, Ihnatouski M, Daunoraviciene K, Laskhousky U, Griskevicius J
Acta Bioeng Biomech. 2016;18(2):121-9.

PURPOSE: Spastic diplegia is the most common form of cerebral palsy. It presents with symmetric involvement of the lower limbs and upper limbs. Children with spastic diplegia frequently experience problems with motor control, spasticity, and balance which lead to gait abnormalities. The aim of this study is twofold. Firstly, to determine the differences in spatial-temporal gait parameters and magnitude of plantar pressure distribution between children with spastic diplegia (CP) and typical children. Secondly, to compare and evaluate main changes of plantar pressure and spatial-temporal gait parameters instead of data between spastic diplegia children with prescribed ankle - solid foot orthosis (AFOs) and without using AFOs.
METHODS: The evaluation was carried out on 20 spastic diplegia children and 10 agematched children as a control group aged 6-15 years. Twenty children with spastic diplegia CP were divided into two groups: ten subjects with prescribed AFOs and ten subjects without use of assistive device. Patients used the AFOs orthosis for one year. Measurements included in-shoe plantar pressure distribution and spatial-temporal gait parameters.
RESULTS: Spatial-temporal gait parameters showed meaningful difference between study groups in velocity, stride length, step length and cadence ($p < 0.05$). However no significant differences between patients with and without AFOs were found ($p > 0.05$). Significant differences between typical and spastic diplegia children with AFOs were observed in the magnitude of plantar pressure under the toes, the metatarsal heads, the medial arch, and the heel ($p < 0.05$). For typical subjects, the highest pressure amplitudes were found under the heel and the metatarsal heads, while the lowest pressure distribution was under the medial arch. In CP patients the lateral arch was strongly unloaded. The peak pressure under heel was shifted inside.

CONCLUSIONS: Collected data and calculated scores present a state of the gait in test groups, showed the difference and could be valuable for physicians in decision making by choosing qualitative therapy. Furthermore, it allows predicting probability of further possible changes in gait of spastic diplegia patients with AFOs and without it. In conclusion, our current results showed that the use of AFOs, prescribed on a clinical basis by doctors improves gait patterns and gait stability in children with spastic cerebral palsy.
PMID: 27405783 [PubMed - in process]

The Efficacy of Ankle-Foot Orthoses on Improving the Gait of Children With Diplegic Cerebral Palsy: A Multiple Outcome Analysis.
Ries AJ, Novacheck TF, Schwartz MH
PM R. 2015 Sep;7(9):922-9. doi: 10.1016/j.pmrj.2015.03.005. Epub 2015 Mar 11.

BACKGROUND: Ankle-foot orthosis (AFO) prescriptions are common for patients diagnosed with cerebral palsy (CP). Typical treatment objectives are to improve ankle-foot function and enhance general gait quality.
OBJECTIVE: To determine the effectiveness of AFOs for improving the gait of children with diplegic CP.
DESIGN: Retrospective analysis.
SETTING: Primary clinical care facility.
PARTICIPANTS: Data were used from 601 visits for 378 individuals (age at visit: 9.8 ± 3.8 years [mean ± standard deviation]) who wore either a solid, hinged, or posterior leaf spring AFO design. Participants had a diagnosis of diplegic CP, wore the same AFO design bilaterally, and had 3-dimensional gait analysis data collected while walking both barefoot and with AFOs during a single session.
METHODS: Differences between walking with AFOs and walking barefoot were used as outcome measures. Statistical analysis consisted of paired t-tests and multivariate analysis of variance scores to determine significance, main effects, and interactions of AFO design, ambulation type (walking with/without assistive devices), and barefoot level on each outcome. Minimal clinically important differences from the literature determined clinical significance.
OUTCOME MEASURES: Gait Deviation Index (GDI), ankle Gait Variable Score, knee Gait Variable Score, nondimensional speed, and nondimensional step length.
RESULTS: Only step length exhibited clinically meaningful improvements for the average AFO user. Changes in step length, speed, and GDI all were statistically significant ($P < .001$). Barefoot outcome levels were the most consistent influence on outcome changes. AFO design was shown to effect changes in speed and ankle function, whereas ambulation type was shown to affect GDI change.
CONCLUSIONS: Current AFO prescription methodologies for children with CP result in consistent gait improvements for step length only. This study emphasizes the need to develop more effective AFO prescription algorithms in an effort to improve the efficacy of AFOs on general gait quality via optimizing patient selection or AFO design.

DOI: 10.1016/j.pmrj.2015.03.005
PMID: 25771349 [PubMed - indexed for MEDLINE]

Robots

What is it like to walk with the help of a robot? Children's perspectives on robotic gait training technology.
Phelan SK, Gibson BE, Wright FV
Disabil Rehabil. 2015;37(24):2272-81. doi: 10.3109/09638288.2015.1019648. Epub 2015 Apr 9.

PURPOSE: Robotic gait training is an emerging intervention that holds great therapeutic promise in the rehabilitation of children with neuromotor disorders such as cerebral palsy (CP). Little is known about children and parents' views on this new technology. The purpose of this qualitative study was to investigate the expectations and experiences of children with CP in relation to robotic gait training using the Lokomat®Pro.
METHOD: An interpretivist qualitative design was employed in which perspectives of children and parents were elicited through separate semi-structured interviews to examine expectations of and experiences with the Lokomat.
RESULTS: Four themes related to children's expectations and experiences using the Lokomat were identified: (1) Not sure what to expect, but okay, I will do it; (2) It's more than just the Lokomat, it's the people that make the

difference; (3) Having mixed impressions about the Lokomat; and (4) It's probably helping me, but I don't really know.
CONCLUSIONS: Rehabilitation professionals, researchers and parents are encouraged to reflect on why and how one might engage children in gait-related rehabilitation in ways that appeal to children's desires and expectations. This may shape how interventions are presented to children and how goals and outcomes are framed. Implications for Rehabilitation Children in this study did not consistently feel excited about, have a wish to use, or have a sustained interest in the use of a robotic technology, and at times experienced some anxiety in relation to their participation in the intervention. Contrary to assumptions that disabled children value walking "normally", children in this study did not express a desire to walk in typical (non-disabled) gait patterns, and equated so-called "normal" walking with their usual walking styles. Thus, we encourage clinicians, researchers and parents to reflect on why, when and how best to engage children in gait-related rehabilitation in ways that appeal to and align with children's desires and expectations.
DOI: 10.3109/09638288.2015.1019648
PMID: 25856202 [PubMed - indexed for MEDLINE]

Stimulation cérébrale - Stimulation neurosensorielle

Advancing non-invasive neuromodulation clinical trials in children: Lessons from perinatal stroke.
Kirton A
Eur J Paediatr Neurol. 2016 Jul 9. pii: S1090-3798(16)30091-5. doi: 10.1016/j.ejpn.2016.07.002. [Epub ahead of print]

Applications of non-invasive brain stimulation including therapeutic neuromodulation are expanding at an alarming rate. Increasingly established scientific principles, including directional modulation of well-informed cortical targets, are advancing clinical trial development. However, high levels of disease burden coupled with zealous enthusiasm may be getting ahead of rational research and evidence. Experience is limited in the developing brain where additional issues must be considered. Properly designed and meticulously executed clinical trials are essential and required to advance and optimize the potential of non-invasive neuromodulation without risking the well-being of children and families. Perinatal stroke causes most hemiplegic cerebral palsy and, as a focal injury of defined timing in an otherwise healthy brain, is an ideal human model of developmental plasticity. Advanced models of how the motor systems of young brains develop following early stroke are affording novel windows of opportunity for neuromodulation clinical trials, possibly directing neuroplasticity toward better outcomes. Reviewing the principles of clinical trial design relevant to neuromodulation and using perinatal stroke as a model, this article reviews the current and future issues of advancing such trials in children.

DOI: 10.1016/j.ejpn.2016.07.002
PMID: 27470654 [PubMed - as supplied by publisher]

Réalité virtuelle - Jeux video

Does a Combination of Virtual Reality, Neuromodulation and Neuroimaging Provide a Comprehensive Platform for Neurorehabilitation? - A Narrative Review of the Literature.
Teo WP, Muthalib M, Yamin S, Hendy AM, Bramstedt K, Kotsopoulos E, Perrey S, Ayaz H
Front Hum Neurosci. 2016 Jun 24;10:284. doi: 10.3389/fnhum.2016.00284. eCollection 2016.

In the last decade, virtual reality (VR) training has been used extensively in video games and military training to provide a sense of realism and environmental interaction to its users. More recently, VR training has been explored as a possible adjunct therapy for people with motor and mental health dysfunctions. The concept underlying VR therapy as a treatment for motor and cognitive dysfunction is to improve neuroplasticity of the brain by engaging users in multisensory training. In this review, we discuss the theoretical framework underlying the use of VR as a therapeutic intervention for neurorehabilitation and provide evidence for its use in treating motor and mental disorders such as cerebral palsy, Parkinson's disease, stroke, schizophrenia, anxiety disorders, and other related clinical areas. While this review provides some insights into the efficacy of VR in clinical rehabilitation and its complimentary use with neuroimaging (e.g., fNIRS and EEG) and neuromodulation (e.g., tDCS and rTMS), more

research is needed to understand how different clinical conditions are affected by VR therapies (e.g., stimulus presentation, interactivity, control and types of VR). Future studies should consider large, longitudinal randomized controlled trials to determine the true potential of VR therapies in various clinical populations.

Free PMC Article

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PMCID: PMC4919322
PMID: 27445739 [PubMed]

Novel Virtual Environment for Alternative Treatment of Children with Cerebral Palsy.

de Oliveira JM, Fernandes RC, Pinto CS, Pinheiro PR, Ribeiro S, de Albuquerque VH

Comput Intell Neurosci. 2016;2016:8984379. doi: 10.1155/2016/8984379. Epub 2016 Jun 14.

Cerebral palsy is a severe condition usually caused by decreased brain oxygenation during pregnancy, at birth or soon after birth. Conventional treatments for cerebral palsy are often tiresome and expensive, leading patients to quit treatment. In this paper, we describe a virtual environment for patients to engage in a playful therapeutic game for neuropsychomotor rehabilitation, based on the experience of the occupational therapy program of the Nucleus for Integrated Medical Assistance (NAMI) at the University of Fortaleza, Brazil. Integration between patient and virtual environment occurs through the hand motion sensor "Leap Motion," plus the electroencephalographic sensor "MindWave," responsible for measuring attention levels during task execution. To evaluate the virtual environment, eight clinical experts on cerebral palsy were subjected to a questionnaire regarding the potential of the experimental virtual environment to promote cognitive and motor rehabilitation, as well as the potential of the treatment to enhance risks and/or negatively influence the patient's development. Based on the very positive appraisal of the experts, we propose that the experimental virtual environment is a promising alternative tool for the rehabilitation of children with cerebral palsy.

Free PMC Article

DOI: 10.1155/2016/8984379
PMCID: PMC4923569
PMID: 27403154 [PubMed - in process]

Self-paced versus fixed speed walking and the effect of virtual reality in children with cerebral palsy.

Sloot LH, Harlaar J, van der Krogt MM

Gait Posture. 2015 Oct;42(4):498-504. doi: 10.1016/j.gaitpost.2015.08.003. Epub 2015 Aug 18.

While feedback-controlled treadmills with a virtual reality could potentially offer advantages for clinical gait analysis and training, the effect of self-paced walking and the virtual environment on the gait pattern of children and different patient groups remains unknown. This study examined the effect of self-paced (SP) versus fixed speed (FS) walking and of walking with and without a virtual reality (VR) in 11 typically developing (TD) children and nine children with cerebral palsy (CP). We found that subjects walked in SP mode with twice as much between-stride walking speed variability ($p<0.01$), fluctuating over multiple strides. There was no main effect of SP on kinematics or kinetics, but small interaction effects between SP and group (TD versus CP) were found for five out of 33 parameters. This suggests that children with CP might need more time to familiarize to SP walking, however, these differences were generally too small to be clinically relevant. The VR environment did not affect the kinematic or kinetic parameters, but walking with VR was rated as more similar to overground walking by both groups ($p=0.02$). The results of this study indicate that both SP and FS walking, with and without VR, can be used interchangeably for treadmill-based clinical gait analysis in children with and without CP.

DOI: 10.1016/j.gaitpost.2015.08.003
PMID: 26338532 [PubMed - indexed for MEDLINE]

Using Free Internet Videogames in Upper Extremity Motor Training for Children with Cerebral Palsy.

Behav Sci (Basel). 2016 Jun 7;6(2). pii: E10. doi: 10.3390/bs6020010.

Sevick M, Eklund E, Mensch A, Foreman M, Standeven J, Engsberg J

Movement therapy is one type of upper extremity intervention for children with cerebral palsy (CP) to improve function. It requires high-intensity, repetitive and task-specific training. Tedium and lack of motivation are substantial barriers to completing the training. An approach to overcome these barriers is to couple the movement therapy with videogames. This investigation: (1) tested the feasibility of delivering a free Internet videogame upper extremity motor intervention to four children with CP (aged 8-17 years) with mild to moderate limitations to upper limb function; and (2) determined the level of intrinsic motivation during the intervention. The intervention used free Internet videogames in conjunction with the Microsoft Kinect motion sensor and the Flexible Action and Articulated Skeleton Toolkit software (FAAST) software. Results indicated that the intervention could be successfully delivered in the laboratory and the home, and pre- and post- impairment, function and performance assessments were possible. Results also indicated a high level of motivation among the participants. It was concluded that the use of inexpensive hardware and software in conjunction with free Internet videogames has the potential to be very motivating in helping to improve the upper extremity abilities of children with CP. Future work should include results from additional participants and from a control group in a randomized controlled trial to establish efficacy.

Free PMC Article

DOI: 10.3390/bs6020010
PMCID: PMC4931382
PMID: 27338485 [PubMed]

Thérapie cellulaire Médecine regénérative

Treatment of Cerebral Palsy with Stem Cells: A Report of 17 Cases.

Chahine NH, Wehbe TW, Hilal RA, Zoghbi VV, Melki AE, Habib EB

Int J Stem Cells. 2016 May 30;9(1):90-5. doi: 10.15283/ijsc.2016.9.1.90.

Cerebral Palsy (CP) is a disabling condition that affects a child's life and his/her family irreversibly. It is usually a non-progressive condition but improvement over time is rarely seen. The condition can be due to prenatal hypoxia, metabolic, genetic, infectious, traumatic or other causes. It is therefore a heterogeneous group that results in functional motor disability associated with different degrees of cognitive abnormalities. There are no treatments that can cure or even improve CP and the best available approach aims at functional, social and nutritional supportive care and counseling. In this paper, we report 17 sequential patients with CP treated with intrathecal administration of Bone Marrow Mononuclear Cells (BMMC). All patients had an uneventful post-injection course with 73% of the evaluable patients treated having a good response using the Gross Motor Function Classification System (GMFCS). The average improvement was 1.3 levels on the GMFCS with cognitive improvements as well.

DOI: 10.15283/ijsc.2016.9.1.90
PMID: 27426090 [PubMed]

Autres

Effects of hippotherapy on body functions, activities and participation in children with cerebral palsy based on ICF-CY assessments.

Hsieh YL, Yang CC, Sun SH, Chan SY, Wang TH, Luo HJ

Disabil Rehabil. 2016 Jul 20:1-11. [Epub ahead of print]

PURPOSE: To evaluate the effects of hippotherapy on body functions, activities, and participation in children with CP of various functional levels by using the International Classification of Functioning, Disability and Health-Children and Youth (ICF-CY) checklist.

METHODS: Fourteen children with cerebral palsy (CP) (3-8 years of age) were recruited for a 36-week study composed of baseline, intervention, and withdrawal phases (12 weeks for each phase, ABA design). Hippotherapy was implemented for 30 min once weekly for 12 consecutive weeks during the intervention phase. Body Functions (b) and Activities and Participation (d) components of the ICF-CY checklist were used as outcome measures at the initial interview and at the end of each phase.

RESULTS: Over the 12 weeks of hippotherapy, significant improvements in ICF-CY qualifiers were found in neuromusculoskeletal and movement-related functions (b7), mobility (d4) and major life areas (d8) and, in particular, mobility of joint functions (b710), muscle tone functions (b735), involuntary movement reaction functions (b755), involuntary movement functions (b765), and play (d811) (all $p < 0.05$) when compared with baseline.
CONCLUSION: This study demonstrated the beneficial effects of hippotherapy on body functions, activities, and participation in children with CP. Implications for Rehabilitation ICF-CY provides a comprehensive overview of functioning and disability and constitutes a universal language for identifying the benefits of hippotherapy in areas of functioning and disability in children with CP. In children with CP, hippotherapy encourages a more complementary approach that extends beyond their impairments and limitations in body functions, activities, and participation. The effect of hippotherapy was distinct from GMFCS levels and the majority of improvements were present in children with GMFCS levels I-III.
DOI: 10.1080/09638288.2016.1207108
PMID: 27440177 [PubMed - as supplied by publisher]

Langage – Communication

Classification systems of communication for use in epidemiological surveillance of children with cerebral palsy.
Virella D, Pennington L, Andersen GL, Andrada Mda G, Greitane A, Himmelmann K, Prasauskiene A, Rackauskaite G, De La Cruz J, Colver A; Surveillance of Cerebral Palsy in Europe Network.
Dev Med Child Neurol. 2016 Mar;58(3):285-91. doi: 10.1111/dmcn.12866. Epub 2015 Aug 14. Comment in Dev Med Child Neurol. 2016 Mar;58(3):224-5.

AIM: Children with cerebral palsy (CP) often experience communication difficulties. We aimed to identify a classification system for communication of children with CP suitable for epidemiological surveillance.
METHOD: Systems to classify the communication of children with CP were identified. The Communication Function Classification System (CFCS), Functional Communication Classification System (FCCS), and Viking Speech Scale (VSS) were chosen for further investigation and translated. They were administered to 155 children aged 4 to 13 years with CP (across all motor severity levels) from eight European countries. Children's parents/carers, speech therapists, and other health professionals applied the systems through direct observation. Other professionals applied them from case notes only. The systems were assessed for agreement, stability, ease, and feasibility of application.
RESULTS: Test-retest stability was moderate-to-high for VSS (k=0.66-0.88), CFCS (k=uncomputed-0.91), and FCCS (k=0.52-0.91). Overall interrater agreement was fair to very good for every classification system. VSS achieved the best agreement between parents/carers and speech therapists. VSS was considered the easiest instrument to apply.
INTERPRETATION: Because of its ease of use by a range of healthcare professionals, the VSS should be considered for CP registers which intend to survey speech intelligibility. For a wider assessment of communication, the CFCS or FCC should be considered.

DOI: 10.1111/dmcn.12866
PMID: 26272847 [PubMed - indexed for MEDLINE]

Effects of Abnormal Oral Reflexes on Speech Articulation in Persian Speaking Children with Spastic Cerebral Palsy.
Dadgar H, Hadian MR, Lira OA
Iran J Child Neurol. 2016 Summer;10(3):28-34

OBJECTIVE: The purpose of this study was to investigate the relationship between the presence of abnormal oral reflexes and speech sound production in children with severe cerebral palsy.
MATERIALS & METHODS: Seven oral reflexes such as, rooting, mouth-opening, biting, chewing, lip, tongue, and suckling were examined in 52Persian-speaking monolingual children with spastic cerebral palsy (ages 5-10 yr). Phonetic information tests were administered to investigate their ability for articulation of the speech sounds.
RESULTS: A significant relationship between three (i.e. the chewing, lip, and biting reflexes) out of the seven abnormal oral reflexes and the speech articulation was noticed. The presence of the chewing reflex was associated with deficits in production of /s, z, š,č/ sounds. The lip reflex was associated with deficits in the production of /p, m,

r, j, f, č/ sounds. The biting reflex was associated with deficits in the production of /z, l, y and š/ sounds. No significant relationship was found between the rooting, mouth-opening, tongue, and suckling reflexes and sound articulation.
CONCLUSION: The presence of abnormal reflexes in the children with spastic cerebral palsy would suggest a correlation between these reflexes and sound articulation in Iranian children with spastic cerebral palsy. Hence, these observations might suggest some disturbances in normal speech development.
PMCID: PMC4928613 [Available on 2016-10-01]
PMID: 27375753 [PubMed]

Douleur

Epidural analgesia is superior to local infiltration analgesia in children with cerebral palsy undergoing unilateral hip reconstruction.
Kjeldgaard Pedersen L, Nikolajsen L, Rahbek O, Uldall Duch B, Møller-Madsen B
Acta Orthop. 2016;87(2):176-82. doi: 10.3109/17453674.2015.1113375. Epub 2015 Nov6.

BACKGROUND AND PURPOSE: Treatment of postoperative pain in children with cerebral palsy (CP) is a major challenge. We investigated the effect of epidural analgesia, high-volume local infiltration analgesia (LIA), and an approximated placebo control on early postoperative pain in children with CP who were undergoing unilateral hip reconstruction.
PATIENTS AND METHODS: Between 2009 and 2014, we included 18 children with CP. The first part of the study was a randomized double-blind trial with allocation to either LIA or placebo for postoperative pain management, in addition to intravenous or oral analgesia. In the second part of the study, the children were consecutively included for postoperative pain management with epidural analgesia in addition to intravenous or oral analgesia. The primary outcome was postoperative pain 4 h postoperatively using 2 pain assessment tools (r-FLACC and VAS-OBS) ranging from 0 to 10. The secondary outcome was opioid consumption over the 21-h study period.
RESULTS: The mean level of pain 4 h postoperatively was lower in the epidural group (r-FLACC: 0.7; VAS-OBS: 0.6) than in both the LIA group (r-FLACC: 4.8, $p = 0.01$; VAS-OBS: 5.2, $p = 0.02$) and the placebo group (r-FLACC: 5.2, $p = 0.01$; VAS-OBS: 6.5, $p < 0.001$). Corrected for body weight, the mean opioid consumption was lower in the epidural group than in the LIA group and the placebo group (both $p < 0.001$).
INTERPRETATION: Epidural analgesia is superior to local infiltration analgesia for early postoperative pain management in children with cerebral palsy who undergo unilateral hip reconstruction.
Free PMC Article
DOI: 10.3109/17453674.2015.1113375
PMCID: PMC4812081
PMID: 26541479 [PubMed - indexed for MEDLINE]

Professionals' Perceptions about the Need for Pain Management Interventions for Children with Cerebral Palsy in South African School Settings.
Nilsson S, Johnson E, Adolfsson M
Pain Manag Nurs. 2016 Aug;17(4):249-61. doi: 10.1016/j.pmn.2016.03.002. Epub 2016 Jun 24.

Pain is common in children with cerebral palsy (CP) and may have negative consequences for children's success in their studies. Research has shown that pain in childhood negatively influences individuals' participation and quality of life in later years. This study investigated how professionals in South African school settings respond to children's need for pain management in an attempt to enable the children to be active participants in school activities, despite their pain. The study was descriptive and followed a qualitative design (i.e., focus group interviews with semistructured questions and a conventional content analysis). Five government schools for children with special education needs in South Africa's Gauteng province participated. Participants/Subjects: Thirty-eight professionals who represented eight professions. Professional statements on the topic were collected from five focus group sessions conducted during one week. Qualitative content analysis of the data was performed. Similar statements were combined, coded, and sorted into main categories and subcategories. The analysis identified three main categories for pain management: environmental, treatment, and support strategies. In addition, four groups of

statements emerged on how contextual factors might affect pain in children with CP and their participation in school settings. It is important to train professionals in pain management and to implement structured models for pain prevention and management to ensure that best practices are adhered to for children with CP who suffer from acute or chronic pain.

DOI: 10.1016/j.pmn.2016.03.002
PMID: 27349380 [PubMed - in process]

Autres Troubles /troubles concomitants

Status dystonicus in children: Early recognition and treatment prevent serious complications.
Combe L, Abu-Arafeh I
Eur J Paediatr Neurol. 2016 Jul 12. pii: S1090-3798(16)30094-0. doi: 10.1016/j.ejpn.2016.07.005. [Epub ahead of print]

This is a retrospective study of all patients presenting to our paediatric unit with status dystonicus (SD) over a period of five years. Anonymous information was collected and a descriptive analysis is made. There were four episodes of SD in three children between 11 and 15 years of age. All children are known to have severe dyskinetic cerebral palsy and presented with an acute or sub-acute deterioration in their symptoms. Symptoms were triggered by infections in three of the four episodes. Early features included frequent and repetitive generalized muscle spasms, poor swallowing, poor sleep, distress and pain. Patients responded to supportive treatment, rehydration, benzodiazepines, baclofen and l-dopa. Intensive care was not necessary in any of the patients and patients made full recovery within 5-14 days. This report shows the value of early recognition and treatment of SD can be successful in preventing serious complications.

DOI: 10.1016/j.ejpn.2016.07.005
PMID: 27444503 [PubMed - as supplied by publisher]

Troubles respiratoires

Clinical and Pulmonary Function Markers of Respiratory Exacerbation Risk in Subjects With Quadriplegic Cerebral Palsy.
Vianello A, Carraro E, Pipitone E, Marchese-Ragona R, Arcaro G, Ferraro M, Paladini L Martinuzzi A
Respir Care. 2015 Oct;60(10):1431-7. doi: 10.4187/respcare.04024. Epub 2015 Apr 28.

BACKGROUND: Although respiratory exacerbations are common in patients with quadriplegic cerebral palsy (CP), little is known about the factors that are related to increased exacerbation risk. This study aimed to identify the clinical and pulmonary function variables signaling risk of exacerbation in this type of patient.
METHODS: Thirty-one children and young adults with quadriplegic CP underwent a comprehensive history, physical examination, and pulmonary function test, including arterial blood gas analysis, airway resistance using the interrupter technique, and home overnight SpO2 monitoring. Subjects were divided into 2 groups depending on the number of respiratory exacerbations reported during the year before study entry: frequent exacerbators (ie, ≥ 2 exacerbations) and infrequent exacerbators (ie, < 2 exacerbations).
RESULTS: The frequent exacerbators were more likely to require hospitalization due to respiratory disorders compared with the infrequent exacerbators (13/14 vs 9/17, P = .02). Respiratory exacerbation was found to be associated with diagnosis of gastroesophageal reflux (adjusted odds ratio of 23.95 for subjects with confirmed diagnosis, P = .02) and higher PaCO2 levels (adjusted odds ratio of 12.60 for every 5-mm Hg increase in PaCO2 , P = .05). Subjects with PaCO2 ≥ 35 mm Hg showed an exacerbation odds ratio of 15.2 (95% CI 1.5-152.5, P = .01).
CONCLUSIONS: Gastroesophageal reflux and increased PaCO2 can be considered simple, clinically useful markers of increased exacerbation risk in young subjects with quadriplegic CP.

DOI: 10.4187/respcare.04024
PMID: 25922546 [PubMed - indexed for MEDLINE]

Multimodality assessment of upper airway obstruction in children with persistent obstructive sleep apnea after adenotonsillectomy.
Clark C , Ulualp SO
Laryngoscope. 2016 Jul 14. doi: 10.1002/lary.26174. [Epub ahead of print]

OBJECTIVES/HYPOTHESIS: Children with obstructive sleep apnea (OSA) may have multiple sites of upper airway obstruction (UAO). A wide variety of techniques has been used to evaluate UAO. Our aim was to compare findings of cine magnetic resonance imaging (MRI) and drug-induced sleep endoscopy (DISE) in identifying UAO sites in children with persistent OSA after adenotonsillectomy (AT).
STUDY DESIGN: Retrospective chart review.
MATERIAL AND METHODS: The medical records of children who underwent DISE and cine MRI were reviewed. Data pertaining to demographics, past medical history, body mass index, polysomnography, findings of DISE, and cine MRI were obtained.
RESULTS: Fifteen children (11 boys, 4 girls; age range, 7-18 years) were identified. Comorbid conditions were Down syndrome in nine patients, cerebral palsy in one, attention deficit hyperactivity disorder in two, and asthma in three. Severity of OSA was moderate in five, and severe in 10. DISE and cine MRI showed the same UAO site in 10 patients: a single site (tongue) in nine and multiple sites (tongue and oropharynx/lateral walls) in one. DISE showed additional UAO sites undetected by cine MRI in three patients. Cine MRI showed additional UAO sites undetected by DISE in one patient. DISE and cine MRI showed different sites of obstruction in one patient.
CONCLUSIONS: Cine MRI and DISE documented single and multiple sites of UAO in children with persistent OSA after AT. Cine MRI and DISE findings were similar in the majority of the children. Assessment of the sensitivity and specificity of cine MRI and DISE in detecting sites of UAO merits further investigation.
LEVEL OF EVIDENCE: 4. Laryngoscope, 2016.

DOI: 10.1002/lary.26174
PMID: 27411973 [PubMed - as supplied by publisher]

Troubles musculosquelettiques, des tissus conjonctifs et osseux

Bone density assessment in a tertiary paediatric centre over 13 years: Referral patterns and limitations.
Jones AR, Zacharin MR, Cameron FJ, Simm PJ
J Paediatr Child Health. 2015 Jun;51(6):608-13. doi: 10.1111/jpc.12789. Epub 2015 Jan 26.

AIM: This study aims to examine the referral practices for the Royal Children's Hospital (RCH) bone density service over the past 13 years and to demonstrate referral patterns and possible limitations to accessing paediatric bone densitometry.
METHODS: All patients attending the RCH Healthy Bones Unit for bone densitometry from 1 July 1999 to 30 June 2012, aged under 18 years of age, were included. Densitometry results were downloaded directly from the Hologic scanner into an Excel document. However, the referring unit and indication for referral were collected manually from either the referral card or the hospital's scanned medical records system.
RESULTS: A total of 5767 bone densitometry scans were performed over the study period on 3004 patients. The majority of referrals were made by the Endocrinology department, followed by Adolescent Medicine, Gastroenterology and Neurology. Relatively few referrals were made by general paediatrics. The most common indication for bone density test overall was eating disorders, followed by steroid use, osteogenesis imperfecta and other collagen disorders and inflammatory bowel disease. The lowest lumbar spine z-scores by indication were for cerebral palsy and other causes of immobility.
CONCLUSIONS: Multiple childhood diseases predispose to low bone density; however, paediatric bone densitometry is still underutilised and not appropriately supported by subsidies.

DOI: 10.1111/jpc.12789
PMID: 25622653 [PubMed - indexed for MEDLINE]

Informing evidence-based clinical practice guidelines for children with cerebral palsy at risk of osteoporosis: an update.

Ozel S, Switzer L, Macintosh A, Fehlings D

Dev Med Child Neurol. 2016 Jul 20. doi: 10.1111/dmcn.13196. [Epub ahead of print]

AIM: To investigate the impact of new evidence for weight-bearing, bisphosphonates, and vitamin D and calcium interventions, towards updating the systematic review and clinical practice guidelines for osteoporosis in children with cerebral palsy (CP) published in 2011.
METHOD: Computer-assisted literature searches were conducted for articles published from 2010 to 2016. Searches focused on children with CP functioning at Gross Motor Function Classification System levels III to V and limited to weight-bearing activities, bisphosphonates, and vitamin D and/or calcium supplementation. Articles were classified according to the American Academy of Neurology guidelines to update the grading of the evidence for improving bone mineral density (BMD) and decreasing fragility fractures.
RESULTS: Six new articles underwent full-text review and data abstraction. These included one weight-bearing, three bisphosphonate, and two mixed intervention studies (bisphosphonate and vitamin D/calcium supplementation). Overall, there continues to be 'probable' evidence for bisphosphonates, 'possible' evidence for vitamin D/calcium, and 'insufficient' evidence for weight-bearing activities as effective interventions to improve low BMD in children with CP. There is 'possible' evidence for bisphosphonates in reducing fragility fractures.
INTERPRETATION: The grading of evidence to support the use of weight-bearing activities, bisphosphonates, and vitamin D and calcium supplementation in pediatric CP osteoporosis clinical practice guidelines remained the same.

DOI: 10.1111/dmcn.13196
PMID: 27435427 [PubMed - as supplied by publisher]

Reduced skeletal muscle satellite cell number alters muscle morphology after chronic stretch but allows limited serial sarcomere addition.

Kinney MC, Dayanidhi S, Dykstra PB, McCarthy JJ, Peterson CA, Lieber RL

Muscle Nerve. 2016 Jun 24. doi: 10.1002/mus.25227. [Epub ahead of print]

INTRODUCTION: Muscles add sarcomeres in response to stretch, presumably to maintain optimal sarcomere length. Clinical evidence from patients with cerebral palsy (CP), who have both decreased serial sarcomere number and reduced satellite cells (SCs), suggests a hypothesis that SCs may be involved in sarcomere addition.
METHODS: A transgenic Pax7-DTA mouse model underwent conditional SC depletion, and their soleii were then stretch-immobilized to assess their capacity for sarcomere addition. Muscle architecture, morphology, and extra-cellular matrix (ECM) changes were also evaluated.
RESULTS: Mice in the SC-reduced group achieved normal serial sarcomere addition in response to stretch. However, muscle fiber cross-sectional area was significantly smaller and was associated with hypertrophic extra-cellular matrix (ECM) changes, consistent with fibrosis.
DISCUSSION: While a reduced SC population does not hinder serial sarcomere addition, SCs do play a role in muscle adaptation to chronic stretch that involves maintenance of both fiber cross-sectional area and ECM structure. This article is protected by copyright. All rights reserved.
DOI: 10.1002/mus.25227
PMID: 27343167 [PubMed - as supplied by publisher]

Relative fascicle excursion effects on dynamic strength generation during gait in children with cerebral palsy.

Martín Lorenzo T, Lerma Lara S, Martínez-Caballero I, Rocon E

Med Hypotheses. 2015 Oct;85(4):385-90. doi: 10.1016/j.mehy.2015.06.010. Epub 2015 Jun 24.

Evaluation of muscle structure gives us a better understanding of how muscles contribute to force generation which is significantly altered in children with cerebral palsy (CP). While most muscle structure parameters have shown to be significantly correlated to different expressions of strength development in children with CP and typically developing (TD) children, conflicting results are found for muscle fascicle length. Muscle fascicle length determines muscle excursion and velocity, and contrary to what might be expected, correlations of fascicle length to rate of force development have not been found for children with CP. The lack of correlation between muscle fascicle length and rate of force development in children with CP could be due, on the one hand, to the non-optimal joint position adopted for force generation on the isometric strength tests as compared to the position of TD children. On the other hand, the lack of correlation could be due to the erroneous assumption that muscle fascicle length is representative of sarcomere length. Thus, the relationship between muscle architecture parameters reflecting sarcomere length, such as relative fascicle excursions and dynamic power generation, should be assessed. Understanding of the underlying mechanisms of weakness in children with CP is key for individualized prescription and assessment of muscle-targeted interventions. Findings could imply the detection of children operating on the descending limb of the sarcomere length-tension curve, which in turn might be at greater risk of developing crouch gait. Furthermore, relative muscle fascicle excursions could be used as a predictive variable of outcomes related to crouch gait prevention treatments such as strength training.

DOI: 10.1016/j.mehy.2015.06.010
PMID: 26138625 [PubMed - indexed for

Nutrition – Troubles nutritionnels

Evaluation of Functional Status Associated with Overweight in Adults with Cerebral Palsy.
de la Torre-Olivares R, Moreno-Lorenzo C, Pérez-Mármol JM, Cabrera-Martos I, Villaverde-Gutierrez C, Castro Sánchez AM, Aguilar-Ferrándiz ME
Rehabil Nurs. 2016 Jul 22. doi: 10.1002/rnj.293. [Epub ahead of print]

PURPOSE: To describe the motor disability level of ambulatory adults with overweight and cerebral palsy (CP) and to investigate the functional factors associated with weight gain in this population.
DESIGN: Cross-sectional study.
METHODS: Thirty adults with CP were classified according to their body mass index (BMI). Mobility, physical disability, functional independence, gait and balance, gross motor function, and maximum walking speed were assessed to evaluate their
physical status. The influence of demographic and functional factors on BMI was analyzed, using bivariate and multivariate regression analyses.
FINDINGS: Multiple regression analyses showed that age (p = .012) and lower cardiorespiratory function/lower walking distance (p = .048) were significantly associated with higher BMI. Other functional outcomes were not associated with BMI.
CONCLUSIONS: Greater age and reduced walking distance related to cardiorespiratory function seem to be the main factors associated with BMI.
CLINICAL RELEVANCE: Cardiorespiratory rehabilitation is recommended in conjunction with nutritional nursing interventions.

DOI: 10.1002/rnj.293
PMID: 27443819 [PubMed - as supplied by publisher]

Sphère bucco-dentaire – Troubles de la déglutition

Efficacy of Predicting Videofluoroscopic Results in Dysphagic Patients with Severe Cerebral Palsy Using the Mann Assessment of Swallowing Ability.

Su CL, Chen SL, Tsai SW, Tseng FF, Chang SC, Huang YH, Lin YH.
Am J Phys Med Rehabil. 2016 Apr;95(4):270-6. doi: 10.1097/PHM.0000000000000371.

BACKGROUND: The aim of this study was to evaluate the efficacy of the Mann Assessment of Swallowing Ability (MASA) to predict the results of videofluoroscopic swallowing studies.
METHOD: Children with cerebral palsy with suspicion of aspiration were enrolled. The Functional Dysphagia Scale (FDS) was used to quantify the swallowing dysfunction in videofluoroscopic swallowing studies. Correlation between MASA and FDS scores and differences in these two scores between aspirators and nonaspirators and between silent and overt aspirators were analyzed.
RESULTS: Sixteen patients, level IV or V according the Gross Motor Function Classification System, were included. Thirteen patients (81.3%) had aspiration, and 9 (69.2%) were silent aspirators. The MASA scores between aspirators and nonaspirators were not different (median values of total scores, 107.0 and 94.0). The aspirators had higher FDS pharyngeal subtotal scores (P = 0.024) and slightly higher total FDS scores (P = 0.059). The differences in these two scales between silent and overt aspirators were not significant. Correlation coefficients between oral phase subtotal FDS scores and MASA subtotal scores in oral preparation, oral phase, and oral phase total were -0.713 (P < 0.05), -0.428 (P = 0.098), and -0.665 (P < 0.05), respectively. No correlation was found between the pharyngeal subtotal scores in these two scales.
CONCLUSION: MASA was not useful in differentiating aspirators and nonaspirators and between silent and overt aspirators in severely disabled cerebral palsy, but it could predict oral dysfunction in videofluoroscopic swallowing studies.
DOI: 10.1097/PHM.0000000000000371
PMID: 26334418 [PubMed - indexed for MEDLINE]

Oral health in children with physical (Cerebral Palsy) and intellectual (Down Syndrome) disabilities: Systematic review I.
Diéguez-Pérez M, de Nova-García MJ, Mourelle-Martínez MR, Bartolomé-Villar B
J Clin Exp Dent. 2016 Jul 1;8(3):e337-43. doi: 10.4317/jced.52922. eCollection 2016.

INTRODUCTION: Traditionally, patients with physical and/or intellectual disabilities presented greater oral pathology, owing to their condition and to other external factors. Improved social and health conditions make it necessary to update knowledge on their oral and dental health.
MATERIAL AND METHODS: For this purpose, a bibliographic review was done regarding the state of oral health of children with these two types of disability, in comparison with a control group. Some of the guidelines of the PRISMA statement were taken into account. The ranking of the articles found is based on the modified Newcastle-Ottawa Quality Assessment Scale. The final number of articles evaluated was 14. Parameters such as dental caries, oral hygiene, gingival health, dental traumas, malocclusion and habits were considered.
RESULTS: There is no consensus among authors regarding dental caries, oral hygiene and gingival health. The different results obtained are due in part to the fact that the methodologies used were not the same. However, it has been noted that, when studying other parameters and regardless of the methodology employed, the results obtained are similar.
CONCLUSIONS: Children with physical and intellectual disabilities constitute a group that needs early and regular dental care in order to prevent and limit the severity of the pathologies observed.
Free PMC Article
DOI: 10.4317/jced.52922
PMCID: PMC4930646
PMID: 27398187 [PubMed]

Système digestif

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
J Pediatr Surg. 2015 Nov;50(11):1828-32. doi: 10.1016/j.jpedsurg.2015.06.021. Epub 2015 Jul 2.

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. 31.5months, 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 5.8years. 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.

DOI: 10.1016/j.jpedsurg.2015.06.021
PMID: 26210817 [PubMed - indexed for MEDLINE]

Maladies cardio vasculaires

Risk of stroke among patients with cerebral palsy: a population-based cohort study.
Wu CW, Huang SW, Lin JW, Liou TH, Chou LC, Lin HW
Dev Med Child Neurol. 2016 Jun 27. doi: 10.1111/dmcn.13180. [Epub ahead of print]

AIM: The aim of the study was to investigate the risk of stroke in patients with cerebral palsy (CP), based on nationwide data in Taiwan.
METHOD: This prospective cohort study was comprised of patients recorded on the Taiwan Longitudinal Health Insurance Database 2005 (LHID2005) who had a diagnosis of CP (n=1975) in records between 1 January 2004 and 31 December 2007. A comparison group (1:5) drawn from the same database was matched for age and sex (n=9875). Each patient was tracked by data until the development of stroke or the end of 2008. Cox proportional-hazards regression analysis was used to evaluate the hazard ratios after adjusting for potential confounding factors.
RESULTS: Patients with CP were more likely to suffer stroke than the comparison population, after adjusting for potential confounding factors (adjusted hazard ratio: 2.17; 95% confidence interval [CI]: 1.74-2.69). The hazard ratio of stroke was 4.78 (95% CI: 3.18-7.17) and 1.57 (95% CI: 1.20-2.05) for patients with CP aged 50 years and under, and over 50 years respectively.
INTERPRETATION: Cerebral palsy is a risk factor or marker for stroke that is independent of traditional stroke risk factors. Further research in this area is warranted.

DOI: 10.1111/dmcn.13180
PMID: 27346658 [PubMed - as supplied by publisher]

Troubles de la vision

Ophthalmic profile and systemic features of pediatric facial nerve palsy.
Patil-Chhablani P, Murthy S, Swaminathan M.
Eye Sci. 2015 Dec;30(4):147-50.

BACKGROUND: Facial nerve palsy (FNP) occurs less frequently in children as compared to adults but most cases are secondary to an identifiable cause. These children may have a variety of ocular and systemic features associated with the palsy and need detailed ophthalmic and systemic evaluation.

METHODS: This was a retrospective chart review of all the cases of FNP below the age of 16 years, presenting to a tertiary ophthalmic hospital over the period of 9 years, from January 2000 to December 2008.
RESULTS: A total of 22 patients were included in the study. The average age at presentation was 6.08 years (range, 4 months to 16 years). Only one patient (4.54%) had bilateral FNP and 21 cases (95.45%) had unilateral FNP. Seventeen patients (77.27%) had congenital palsy and of these, five patients had a syndromic association, three had birth trauma and nine patients had idiopathic palsy. Five patients (22.72%) had an acquired palsy, of these, two had a traumatic cause and one patient each had neoplastic origin of the palsy, iatrogenic palsy after surgery for hemangioma and idiopathic palsy. Three patients had ipsilateral sixth nerve palsy, two children were diagnosed to have Moebius syndrome, one child had an ipsilateral Duane's syndrome with ipsilateral hearing loss. Corneal involvement was seen in eight patients (36.36%). Amblyopia was seen in ten patients (45.45%). Neuroimaging studies showed evidence of trauma, posterior fossa cysts, pontine gliosis and neoplasms such as a chloroma. Systemic associations included hemifacial macrosomia, oculovertebral malformations, Dandy Walker syndrome, Moebius syndrome and cerebral palsy
CONCLUSIONS: FNP in children can have a number of underlying causes, some of which may be life threatening. It can also result in serious ocular complications including corneal perforation and severe amblyopia. These children require a multifaceted approach to their care.
PMID: 27215002 [PubMed - indexed for MEDLINE]

The challenges of providing eye care for adults with intellectual disabilities.
Li JCh, Wong K, Park AS, Fricke TR, Jackson AJ.
Clin Exp Optom. 2015 Sep;98(5):420-9. doi: 10.1111/cxo.12304.

This review is intended to raise awareness of the importance of providing high-quality eye care for people with intellectual disabilities and the increasing need for this eye care to be community-based. We describe the challenges to the provision of high-quality community-based eye care for people with intellectual disabilities and ideas, evidence and methods for overcoming them. The prevalence of visual impairment in people with intellectual disabilities has been reported to be at least 40 per cent, rising to as high as 100 per cent in those with profound and severe disabilities. A progressive move toward deinstitutionalisation has shifted the provision of care for people with intellectual disabilities. Individuals can have the freedom to access health-care services of their choice. This has posed challenges to the health-care system, including how to deliver high-quality community-based eye care, creating a current significant unmet need for eye-care services. Undiagnosed refractive error and under-prescription of spectacles are major reasons for avoidable visual impairment among people with disabilities. There is an apparent reluctance of optometrists to engage in this work due to the perceived difficulties of working with people with intellectual and multiple disabilities. There are challenges associated with diagnosis and management of ocular conditions in people with intellectual disabilities and the demand is clear. Small shifts in training, knowledge and awareness would place optometry well to meet the challenges of this specialised area of eye care.

DOI: 10.1111/cxo.12304
PMID: 26390904 [PubMed - indexed for MEDLINE]

Troubles du sommeil

Distinctive sleep problems in children with perinatal moderate or mild hypoxic-ischemia.
Ding X, Cheng Z, Sun B, Huang J, Wang L, Han X, Yang Y, Xu W, Cao X, Miao P, Wang Y(, Guo W, Gu Q, Feng X
Neurosci Lett. 2016 Feb 12;614:60-4. doi: 10.1016/j.neulet.2015.12.061. Epub 2016 Jan 4.

Extensive studies focus on the cognitive and motor impairments after perinatal hypoxic-ischemia (HI). Sleep problems, although reported to be associated with cerebral palsy (CP), are often overlooked in non-severe HI patients. Here, by investigating the sleep qualities of children with different degrees of HI, we discovered that sleep initiation and maintenance, sleep-related breathing problems, or circadian rhythmic issues were highly associated with children of moderate or mild HI, respectively. Follow-up MRI studies in 2-year old patients showed that periventricular white matter lesions including periventricular leukomalacia (PVL) were prevalent in moderate, but not mild, HI children. In contrast, the occurrence of pineal cysts had a high risk in children with mild HI. Our study

provides novel insights into the mechanisms of distinctive sleep problems associated with children of different degrees of HI, and therefore sheds light on the studies of targeted therapeutic treatments for sleep disorders in children who suffer from HI.

DOI: 10.1016/j.neulet.2015.12.061
PMID: 26762786 [PubMed - indexed for MEDLINE]

Qualité de vie et rapport au monde

Qualité de vie

Health-related quality of life for chronically ill children.
Cantrell MA, Kelly MM.
MCN Am J Matern Child Nurs. 2015 Jan-Feb;40(1):24-31. doi:10.1097/NMC.0000000000000090.

Approximately 43% of children in the United States (32 million) are currently living with at least 1 of 20 common chronic childhood illnesses. The most common chronic childhood illnesses are asthma, cystic fibrosis, diabetes, obesity, malnutrition, developmental disabilities, cerebral palsy, consequences of low birthweight, and mental illness. For all chronically ill pediatric populations, the outcome of health-related quality of life (HRQOL) is particularly important because many of these children have not and will not be cured, and will continue to manage their chronic illness into adulthood. Advances in biomedical science and technology continue to improve efficacy of treatments and care for chronically ill children, adolescents, and their families, which highlight the importance measurement of HRQOL as a treatment and health status outcome. The construct of HRQOL is subjective, multidimensional, dynamic, and unique to each individual. It includes aspects of physical, psychological, social function, and goal attainment. Outcomes of HRQOL now include the financial implications for these children and their families, as well as financial and organizational consequences for healthcare planning and delivery of services.This article reviews the importance of HRQOL as a health outcome for chronically ill children. A historical overview and synthesis of the conceptualization and measurement of HRQOL for the chronically ill pediatric population is provided. Current research investigations that have measured health outcomes using individual scales tailored to children's specific symptoms health outcomes, such as PROMIS®-Patient Reported Outcomes Measurement Information System-are reviewed. The clinical applications of HRQOL outcomes research include facilitation of patient-healthcare provider communication, improved patient satisfaction, identification of hidden morbidities, a positive impact on clinical decision making, and improvement of patient outcomes over time.
DOI: 10.1097/NMC.0000000000000090
PMID: 25285426 [PubMed - indexed for MEDLINE]

Investigating the impact of pain, age, Gross Motor Function Classification System, and sex on health-related quality of life in children with cerebral palsy.
Findlay B, Switzer L, Narayanan U), Chen S, Fehlings D
Dev Med Child Neurol. 2016 Mar;58(3):292-7. doi: 10.1111/dmcn.12936. Epub 2015 Oct 1. Comment in Dev Med Child Neurol. 2016 Mar;58(3):225-6.

AIM: To explore whether health-related quality of life (HRQOL) can be predicted by pain, age, Gross Motor Function Classification System (GMFCS) level, and sex in children with cerebral palsy (CP) and whether different pain etiologies have varying effects on HRQOL.
METHODS: Children with CP aged 3 to 19 years and their caregivers were consecutively recruited. Caregivers reported their child's pain (Health Utilities Index 3 [HUI3] pain subset) and HRQOL (DISABKIDS questionnaires). Physicians identified pain etiologies. A multiple linear regression model determined whether pain, GMFCS level, sex, and age predicted HRQOL. An ANOVA evaluated the effects of pain etiologies on HRQOL.
RESULTS: Three hundred and forty-four participants were approached and 87% (n=300) participated. Sufficient data were available on 248 (72% of total sample). Sixty-six participants (27%) formed the pain group with HUI3 pain scores of at least 3. The presence of pain and increasing age significantly negatively predicted HRQOL ($p<0.001$, $R(2)=0.141$), while GMFCS and sex did not. Musculoskeletal deformity (24%) and hypertonia (18%) were the most

frequent pain causes. HRQOL statistically differed depending on the pain etiology (p=0.028) with musculoskeletal deformity showing the lowest mean HRQOL.
INTERPRETATION: The presence of pain and increasing age negatively predict HRQOL in CP. musculoskeletal deformity has the greatest negative impact on HRQOL. © 2015 Mac Keith Press.
DOI: 10.1111/dmcn.12936
PMID: 26426208 [PubMed - indexed for MEDLINE]

Quality of Life and Self-Determination: Youth with Chronic Health Conditions Make the Connection.
McDougall J, Baldwin P, Evans J, Nichols M, Etherington N, Wright V.
Appl Res Qual Life. 2016;11:571-599. Epub 2015 Jan 7.

While optimizing quality of life (QOL) is a key goal of rehabilitation care, no previous study has reported on what 'QOL' means to youth with chronic health conditions. In addition, no qualitative studies have explored the relationship between QOL and self-determination (SD). Objectives of this qualitative study were to examine: what the terms 'quality of life' and 'self-determination' mean to youth with chronic conditions; the factors these youth think are linked with these concepts; the relationship they see between concepts, the types of future goals youth have and how they view the connection between their SD and these goals. A descriptive methodology was used. A purposive sample of 15 youth aged 15 to 20 years was obtained. Youth had cerebral palsy, a central nervous system disorder, or autism spectrum disorder. Semi-structured interviews were conducted first, followed by a focus group. Line-by-line coding of transcripts was completed, codes were collapsed into categories, and themes identified. Participants viewed QOL as an overarching personal evaluation of their life, and used terms such as satisfaction and happiness to describe the concept. Factors related to QOL included: 'relationships', 'supportive environments', 'doing things', 'personal growth and moving forward', and 'understanding of self/acceptance of disability'. Participants described SD in such terms as confidence and motivation. Contributors to SD were: 'personal strengths', 'interdependence', and 'functional independence'. SD was considered important to QOL. Youth goals were reflective of the goals of most adolescents. They identified the importance of having key goals that were of personal interest to them. This study adds consumer-based information to the debate over the meaning of QOL. Service providers and decision makers should be aware of the factors that youth feel impact their QOL and SD, the importance of SD to youth QOL, and of SD to future goals, and consider this information when tailoring therapeutic interventions.
Free PMC Article
DOI: 10.1007/s11482-014-9382-7
PMCID: PMC4917566
PMID: 27398103 [PubMed]

Quality of life of cerebral palsy patients and their caregivers: A cross sectional study in a rehabilitation center Khartoum-Sudan (2014 - 2015).
Mohammed FM, Ali SM, Mustafa MA
J Neurosci Rural Pract. 2016 Jul-Sep;7(3):355-61. doi: 10.4103/0976-3147.182778.

BACKGROUND: Cerebral palsy (CP) is group of disorders characterized by long-term disabilities that affect the quality of life (QoL) of both patients and those caring for them.
OBJECTIVE: The objective of this study was to measure the QoL of CP patients and their caregivers and determine the factors affecting both of them.
METHODS: This was a cross-sectional facility-based study. 65 caregivers of children with CP aged 4-18 years completed a self-structured questionnaire. Descriptives of the samples were displayed, and logistic regression was used in the analysis.
RESULTS: The scores of overall QoL of both children and caregivers were low, however, variations were observed among different domains. Both health-related and sociodemographic factors were found to affect the QoL of children and caregivers. The increase in the degree of disability and presence of complications decreased the children QoL while the availability of health insurance improved it. Whereas the QoL of the caregiver was affected by his/her occupation, the degree of child disability did not affect it.
CONCLUSIONS: This study showed that many feasible changes can be adopted to improve the QoL of CP patients and their caregivers.
Free PMC Article

DOI: 10.4103/0976-3147.182778
PMCID: PMC4898102
PMID: 27365951 [PubMed]

Quality of life in children with epilepsy: How does it compare with the quality of life in typical children and children with cerebral palsy?
Mezgebe M, Akhtar-Danesh GG, Streiner DL, Fayed N, Rosenbaum PL, Ronen GM
Epilepsy Behav. 2015 Nov;52(Pt A):239-43. doi: 10.1016/j.yebeh.2015.09.009. Epub 2015 Nov 6.

Our objective was to compare the quality of life (QoL) of children with epilepsy to that of typical children and children with cerebral palsy (CP). We measured self- and proxy-reported QoL of children with epilepsy and contrasted that with data for typical children (European KIDSCREEN project) and children with CP (SPARCLE study). Children ages 8-12 years with epilepsy were recruited from six Canadian sites. Same-aged children with CP and children in the general population aged 8-11 years came from several European countries. All participants completed the KIDSCREEN-52 questionnaire. Our results showed no clinically important differences (>0.5 SD) between self-reported QoL in 345 children with epilepsy compared with 489 children with CP or 5950 children in the general population. However, parents reported clinically important differences between the epilepsy and the other groups in five KIDSCREEN-52 domains. Compared with the CP group, parents of children with epilepsy reported better QoL in physical well-being (Cohen d=0.81), social support (d=0.80), and autonomy (d=0.72). Parents reported poorer QoL in the domains of mood and emotions compared with both contrast groups (d=-0.72 and d=-0.53), and in the domain of bullying compared with the CP group (d=-0.51). Families should find comfort in the results, which indicate that children with epilepsy do not perceive any important differences in QoL compared with their typical peers. The comparisons of parental reports detect their group-specific observations and worries that need to be addressed by the health-care providers and may require specifically designed assessment batteries followed by appropriate interventions.

DOI: 10.1016/j.yebeh.2015.09.009
PMID: 26469801 [PubMed - indexed for MEDLINE]

Reliability and Validity of The Cerebral Palsy Quality of Life Questionnaire in The Turkish Population.
Atasavun Uysal S, Düger T, Elbasan B, Karabulut E, Toylan İ
Percept Mot Skills. 2016 Feb;122(1):150-64. doi: 10.1177/0031512515625388. Epub 2016 Feb 1.

This study examined the psychometric properties of the Turkish version of the Cerebral Palsy Quality of Life Questionnaire (CP QOL). A total of 149 primary caregivers completed the final version of the CP QOL-Primary Caregivers and the Children Health Questionnaire (CHQ) for children 4-12 years old (M age = 7.6 yr., SD = 2.5); 58 children with CP ages 9 to 12 years completed the CP QOL-Child and Health-Related Quality of Life Questionnaire for Children (Kid-KINDL) questionnaire. The Gross Motor Function Classification System was also used for the classification of the children with CP. Internal consistency (Cronbach's α) ranged between .63 and .93 for primary caregivers and .61 to .92 for the children's self-reports. Intra-class correlation coefficients ranged between .88 and .97 for primary caregivers and .91 to .98 for children. It was concluded that the Turkish version of CP QOL questionnaire is a reliable and valid tool for assessing QOL in children with CP.

DOI: 10.1177/0031512515625388
PMID: 27420313 [PubMed

Vie quotidienne

Factors contributing to the longitudinal development of social participation in individuals with cerebral palsy.
Tan SS, van der Slot WM, Ketelaar M, Becher JG, Dallmeijer AJ, Smits DW, Roebroeck ME; PERRIN+ study group.
Res Dev Disabil. 2016 Jul 13;57:125-135. doi: 10.1016/j.ridd.2016.03.015. [Epub ahead of print]

AIMS: We aimed to determine factors associated with the longitudinal development of social participation in a Dutch population of individuals with Cerebral Palsy (CP) aged 1-24 years.
METHODS AND PROCEDURES: For this multicentre prospective longitudinal study, 424 individuals with CP aged 1-24 years were recruited from various rehabilitation centers in The Netherlands. Social participation was measured with the Vineland Adaptive Behavior Scales. We assessed associations with age, intellectual impairment, level of gross motor function, gender, type of CP, manual ability, epilepsy, hearing-, visual-, speech impairment and pain, internalizing- and externalizing behavioral problems, type of education and parental level of education. Each individual was measured 3 or 4 times. The time between measurements was 1 or 2 years.
OUTCOMES AND RESULTS: Epilepsy and speech impairment were each independently associated with the longitudinal development of social participation. The effects were rather small and did not change with age. Also, a trend was found that children attending special education develop less favorably in social participation.
CONCLUSIONS AND IMPLICATIONS: Our results might provide parents and caregivers with starting points to further develop tailored support for individuals with epilepsy, with speech impairment and/or attending special education at risk for suboptimal social participation.

DOI: 10.1016/j.ridd.2016.03.015
PMID: 27423104 [PubMed - as supplied by publisher]

Self-rating of daily time management in children: psychometric properties of the Time-S.
Sköld A, Janeslätt GK
Scand J Occup Ther. 2016 Jul 8:1-9. [Epub ahead of print]

ACKGROUND: Impaired ability to manage time has been shown in several diagnoses common in childhood. Impaired ability involves activities and participation domain (daily time management, DTM) and body function and structure domain (time-processing ability, TPA). DTM needs to be evaluated from an individual's own perspective. To date, there has been a lack of self-rating instruments for children that focus on DTM.
AIM: The aim of this study is to describe psychometric properties of Time-S when used in children aged 10-17 years with a diagnosis of ADHD, Autism, CP or mild ID. Further, to test whether TPA correlates with self-rated DTM.
MATERIAL AND METHODS: Eighty-three children aged 10-17 years participated in the study. Rasch analysis was used to assess psychometric properties. Correlation analysis was performed between Time-S and a measure of TPA.
RESULTS: The 21 items of the Time-S questionnaire fit into a unitary construct measuring self-perceived daily management of an individual's time. A non-significant, small correlation was found between TPA and DTM.
CONCLUSION AND SIGNIFICANCE: The results indicate good psychometric properties for the questionnaire. The questionnaire is potentially useful in intervention planning and evaluation.
DOI: 10.1080/11038128.2016.1185465
PMID: 27387553 [PubMed - as supplied by publisher]

Activité physique - Sport

CAN-flip: A Pilot Gymnastics Program for Children With Cerebral Palsy.
Cook O, Frost G, Twose D, Wallman L, Falk B, Galea V, Adkin A, Klentrou P.
Adapt Phys Activ Q. 2015 Oct;32(4):349-70. doi: 10.1123/APAQ.2015-0026.

This pilot study examined whether an adapted gymnastics program, CAN-flip, could be a feasible activity for children with cerebral palsy (CP) leading to improvements in muscle fitness, motor performance, and physical self-perception. Four girls and 1 boy (9.8 ± 1.3 yr) with CP participated in this multiple-baseline across-subjects design and were randomly assigned to start either the 6-wk gymnastics or the 6-wk control period. Muscle strength, neuromuscular activation, range of motion, gross motor performance, balance, and physical self-perception were assessed at baseline, after the first 6-wk period, and at the conclusion of the study. The gymnastics program comprised two 1-hr individualized classes per week. All participants were able to complete the gymnastics classes without injury and showed improvement in specific gymnastics skills. In addition, 3 of the 5 participants registered for regular gymnastics classes after the study, demonstrating the program's usability as a link to inclusive gymnastic classes.

DOI: 10.1123/APAQ.2015-0026
PMID: 26485738 [PubMed - indexed for MEDLINE]

Effects of Induced Volitional Fatigue on Sprint and Jump Performance in Paralympic Athletes with Cerebral Palsy.
Runciman P, Tucker R, Ferreira S, Albertus-Kajee Y, Derman W.
Am J Phys Med Rehabil. 2016 Apr;95(4):277-90. doi: 10.1097/PHM.0000000000000372.

OBJECTIVE: This study investigated performance, neuromuscular characteristics, and fatigue in Paralympic athletes with cerebral palsy (CP) during a maximal explosive performance trial, compared with well-trained, sprint-specific able-bodied athletes.
DESIGN: Six Paralympic athletes with hemiplegic CP and 12 able-bodied athletes performed one 40-m sprint test (in seconds) and Vertical Jump Tests off both legs (in centimeters), the affected leg individually (in centimeters), and the nonaffected leg individually (in centimeters) before and after an adapted Multistage Shuttle Run Test to exhaustion. Electromyography of five bilateral muscles was measured for mean amplitude (percentage maximum activation).
RESULTS: The 40-m sprint test, Vertical Jump Test off both legs, and Vertical Jump Test off the affected leg were significantly compromised in the CP group, whereas the Vertical Jump Test off the nonaffected leg was similar between groups ($P < 0.05$). Both groups fatigued similarly in performance and electromyography. Affected side electromyography was higher than nonaffected electromyography in the Vertical Jump Test off both legs and Vertical Jump Test off the affected leg in both groups.
CONCLUSIONS: The similarity in fatigue between CP and able-bodied groups confirms that Paralympic athletes with CP may have overcome deficits associated with CP documented in sedentary children. The identified asymmetry may assist with a deeper understanding of performance deficits in CP, as it is indicated that activity generated by both legs is performed toward the capacity of the affected leg.
DOI: 10.1097/PHM.0000000000000372
PMID: 26368834 [PubMed - indexed for MEDLINE]

Prise en charge et Accompagnement

A critical evaluation of the effectiveness of interventions for improving the well-being of caregivers of children with cerebral palsy: a systematic review protocol.
Dambi JM, Jelsma J, Mlambo T, Chiwaridzo M, Tadyanemhandu C , Chikwanha MT, Corten L
Syst Rev. 2016 Jul 13;5(1):112. doi: 10.1186/s13643-016-0287-4.

BACKGROUND: Over the years, family-centered care has evolved as the "gold standard" model for the provision of healthcare services. With the advent of family-centered approach to care comes the inherent need to provide support services to caregivers in addition to meeting the functional needs of children with physical disabilities such as cerebral palsy (CP). Provision of care for a child with CP is invariably associated with poor health outcomes in caregivers. As such, there has been a surge in the development and implementation of interventions for improving the health and well-being of these caregivers. However, there is a paucity of the collective, empirical evidence of the efficacy of these interventions. Therefore, the broad objective of this review is to systematically review the literature on the effectiveness of interventions designed to improve caregivers' well-being.
METHODS/DESIGN: This is a systematic review for the evaluation of the effectiveness of interventions designed to improve caregivers' well-being. Two independent, blinded, reviewers will search articles on PubMed, Scopus, Web of Science, CINAHL, Psych Info, and Africa-Wide Information using a predefined criterion. Thereafter, three independent reviewers will screen the retrieved articles. The methodological quality of studies meeting the selection criterion will be evaluated using the Briggs Institute checklists. Afterwards, two independent researchers will then apply a preset data-extraction form to collect data. We will perform a narrative data analysis of the final sample of studies included for the review.
DISCUSSION: The proposed systematic review will provide the empirical evidence of the efficacy of interventions for improving the well-being of caregivers of children with physical disabilities. This is important given the great need for evidenced-based care and the greater need to improve the health and well-being of caregivers.
SYSTEMATIC REVIEW REGISTRATION: PROSPERO CRD42016033975.
Free PMC Article

DOI: 10.1186/s13643-016-0287-4
PMCID: PMC4944422
PMID: 27412135 [PubMed - in process]

Musculoskeletal system problems and quality of life of mothers of children with cerebral palsy with different levels of disability.
Kavlak E, Altuğ F, Büker N, Şenol H
J Back Musculoskelet Rehabil. 2015;28(4):803-10. doi: 10.3233/BMR-150588.

OBJECTIVE: The objective of this study is to investigate musculoskeletal system problems and quality of life of mothers of children with cerebral palsy with different levels of disability.
METHODS: 100 children (37 girls and 63 boys) with cerebral palsy (CP) and their mothers were included in this study. Functional levels of children with CP were assessed by using the Gross Motor Function Classification System (GMFCS) and the Pediatric Functional Independence Measure (WeeFIM). Quality of life of mothers regarding health was assessed by using the Nottingham Health Profile (NHP). Musculoskeletal system problems of mothers were assessed by using the Neck Disability Index (NDI) and th e Roland-Morris Disability Questionnaire (RMDQ).
RESULTS: No statistical significance was found when GMFCS levels of children with CP and the NHP, DASH-T, RMDQ, NDI and the BAE values of mothers were compared in an inter-group way ($p > 0.05$). When the NHP parameters and the existence of lower and arm pains of mothers were compared with their BAI, NDI, RMDQ and DASH-T scores, a statistically significant relationship was found among them ($p < 0.05$).
CONCLUSION: As functional levels of children with CP get worse, upper extremity, lower back and neck problems and anxiety levels of mothers increase and this situation negatively affects mothers' quality of life.
DOI: 10.3233/BMR-150588
PMID: 25736956 [PubMed - indexed for MEDLINE]

Parents' Experiences and Perceptions when Classifying their Children with Cerebral Palsy: Recommendations for Service Providers.
Phys Occup Ther Pediatr. 2016 Jul 1:1-16. [Epub ahead of print]
Scime NV, Bartlett DJ, Brunton LK, Palisano RJ

AIMS: This study investigated the experiences and perceptions of parents of children with cerebral palsy (CP) when classifying their children using the Gross Motor Function Classification System (GMFCS), the Manual Ability Classification System (MACS), and the Communication Function Classification System (CFCS). The second aim was to collate parents' recommendations for service providers on how to interact and communicate with families.
METHODS: A purposive sample of seven parents participating in the On Track study was recruited. Semi-structured interviews were conducted orally and were audiotaped, transcribed, and coded openly. A descriptive interpretive approach within a pragmatic perspective was used during analysis.
RESULTS: Seven themes encompassing parents' experiences and perspectives reflect a process of increased understanding when classifying their children, with perceptions of utility evident throughout this process. Six recommendations for service providers emerged, including making the child a priority and being a dependable resource.
CONCLUSIONS: Knowledge of parents' experiences when using the GMFCS, MACS, and CFCS can provide useful insight for service providers collaborating with parents to classify function in children with CP. Using the recommendations from these parents can facilitate family-provider collaboration for goal setting and intervention planning.
DOI: 10.1080/01942638.2016.1185505
PMID: 27366828 [PubMed - as supplied by publisher]

Domotique

Control devices for electrically powered wheelchairs: prevalence, defining characteristics and user perspectives.
Dolan MJ, Henderson GI

Disabil Rehabil Assist Technol. 2016 Jul 19:1-7. [Epub ahead of print]

PURPOSE: To determine the prevalence of control devices for electrically powered wheelchairs (EPWs), related characteristic features and users' views on their utility.
METHOD: Postal survey of users of a regional NHS wheelchair service using a purpose-designed questionnaire (n = 262, ≥18 years old).
RESULTS: Mean age 54.4 years, female 56.8%, mean duration EPW use 10.1 years, mean usage 6.7 days per week and 9.2 h per day. Largest diagnostic groups: Multiple Sclerosis 28.3%, Cerebral Palsy 13.8% and Spinal Cord Injury 11.7%. Control device types 94.6% hand joystick, 2.3% chin joystick, 2.7% switches and 0.4% foot control. 42.4% reported fatigue or tiredness and 38.8% pain or discomfort limited EPW use. 28.0% reported an accident or mishap.
CONCLUSIONS: This is the first study of control devices on a large, general population of EPW users. The majority have control devices that meet their needs, with high levels of user satisfaction, though some might benefit from adjustments or modifications to their current provision and others might benefit by changing to a different type of control device. High proportions reported fatigue or tiredness and pain or discomfort limit their EPW use. The study provides indicators for prescribers and manufacturers of control devices for EPWs. Implications for Rehabilitation Most users have control devices that meet their needs, with high levels of satisfaction, but some would benefit from adjustments or modifications or a change of type. A high proportion reported fatigue or tiredness and pain or discomfort limit their use of their EPW and prescribers need to be mindful of these issues when determining the most suitable type of control device and where it should be positioned. The vast majority of users have a hand joystick as a control device with alternative control devices (such as chin joysticks and switches) being far less prevalent. Adverse incidents may arise due to difficulty with manoeuvring or accidental activation of the hand joystick that can lead to collisions and even entrapment.
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