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Interventions and Management

1. Acta Orthop Bras. 2015 May-Jun;23(3):150-3. doi: 10.1590/1413-785220152303145550. Spastic wrist flexion in cerebral palsy. Pronator teres versus flexor carpi ulnaris transfer.

Bisneto Ede N, Rizzi N, Setani EO, Casagrande L, Fonseca J, Fortes G.

OBJECTIVE: Analyze data on patients submitted to transfer of the pronator teres (PT) or the flexor carpi ulnaris (FCB) to the extensor carpi radialis longus/brevis (ECRL/B) in order to correct flexed wrist deformity in patients with cerebral palsy. **METHOD:** Patients were divided into two groups: PT group and FCU group to ECRL/B. The results were evaluated by goniometry and by the functional hand test (FHT). **RESULTS:** Goniometry showed a statistically significant difference in favor of FCU transfer. There was no statistically significant difference regarding FHT. **CONCLUSION:** Both transfers PT and FCU to ECRB are good options to correct wrist flexion deformity in cerebral palsy. Level of Evidence III, Non-randomized Controlled Cohort/Follow-Up Study.

[PMID: 26207093](#)

2. Res Dev Disabil. 2015 Jul 18. pii: S0891-4222(15)00077-3. doi: 10.1016/j.ridd.2015.07.002. [Epub ahead of print]

Differentiation of hand posture to object shape in children with unilateral spastic cerebral palsy.

Wolff AL, Raghavan P, Kaminski T, Hillstrom HJ, Gordon AM.

Quantifying hand-shaping in children with unilateral spastic cerebral palsy (USCP) is the first step in understanding hand posture differentiation. To quantify this ability and determine how hand posture evolves during reach toward various object shapes in children with unilateral spastic cerebral palsy (USCP), 2 groups of children (10 typically developing, and 10 USCP, ages 6-13) were studied in a single-session cross-sectional study. Subjects grasped rectangular, concave, and convex objects with each hand. Metacarpal and proximal interphalangeal joint finger flexion and finger abduction angles were calculated. The extent to which hand posture reflects object shape was calculated using a "visuomotor efficiency (VME) index" (a score of 100 reflects perfect discrimination between objects). A mixed design ANOVA with repeated measures on time was used to compare the VME between groups. Children with USCP demonstrated a lower VME than controls in the affected hand, indicating less effective hand-shaping; $p < .01$. There was also a difference between groups in the evolution of VME throughout reach; $p < .01$. No difference in hand-shaping in the less affected hand in USCP was observed. Analysis of joint angles at contact and VME throughout reach demonstrated that children with USCP differentiated their hand posture to objects of different shapes, but demonstrated deficits in the timing and magnitude of hand-shaping isolated to the affected side. The present study suggests it may be important to consider the quality of hand activity using

quantitative approaches such as VME analyses. Rehabilitation approaches that target these deficits to improve joint mobility and motor control are worth testing.

[PMID: 26198126](#)

**3. IEEE Trans Neural Syst Rehabil Eng. 2015 Jul 20. [Epub ahead of print]
Coordination of reach-to-grasp kinematics in individuals with childhood-onset dystonia due to hemiplegic cerebral palsy.**

Kukke S, Curatalo L, de Campos A, Hallett M, Alter K, Damiano D.

Functional reaching is impaired in dystonia. Here, we analyze upper extremity kinematics to quantify timing and coordination abnormalities during unimanual reach-to-grasp movements in individuals with childhood-onset unilateral wrist dystonia. Kinematics were measured during movements of both upper limbs in a patient group (n = 11, age = 17.5 ± 5 years), and a typically developing control group (n = 9, age = 16.6 ± 5 years). Hand aperture was computed to study the coordination of reach and grasp. Time-varying joint synergies within one upper limb were calculated using a novel technique based on principal component analysis to study intra-limb coordination. In the non-dominant arm, results indicate reduced coordination between reach and grasp in patients who could not lift the grasped object compared to those who could lift it. Lifters exhibit incoordination in distal upper extremity joints later in the movement and non-lifters lacked coordination throughout the movement and in the whole upper limb. The amount of atypical coordination correlates with dystonia severity in patients. Reduced coordination during movement may reflect deficits in the execution of simultaneous movements, motor planning, or muscle activation. Rehabilitation efforts can focus on particular time points when kinematic patterns deviate abnormally to improve functional reaching in individuals with childhood-onset dystonia.

[PMID: 26208359](#)

4. J Pediatr Orthop. 2015 Jul 17. [Epub ahead of print]

Comparison of Rectus Femoris Transfer Surgery Done Concomitant With Hamstring Lengthening or Delayed in Patients With Cerebral Palsy.

Aiona M, Do KP, Feng J, Jabur M.

BACKGROUND: Children with spastic cerebral palsy frequently develop stiff knee gait. A common treatment of flexed knee gait is lengthening of the hamstring tendons. It has been shown that minimum knee extension improves after hamstring surgeries. However, it has been observed that a decreased peak knee flexion in swing may be a complication of hamstring lengthening (HSL). This has been noted to occur because of an overactive rectus femoris during the swing phase of gait. A common treatment of decreased knee flexion in swing is distal rectus femoris transfer (DRFT). The purpose of this study is to compare the differences between doing DRFT concomitantly with HSL and doing delayed DRFT after HSL. **METHODS:** A total of 111 children with cerebral palsy (74 males and 37 females) who underwent HSL were reviewed retrospectively. All patients who met the inclusion criteria were divided into 3 groups, 28 subjects in the HSL alone group (H), 57 subjects in the HSL with concomitant rectus femoris transfer group (C), and 26 subjects in the HSL with delayed rectus femoris transfer group (D). **RESULTS:** The groups had similar minimum knee flexion in stance preoperatively and postoperatively. Group D's minimum knee flexion in stance improved to 5.5±12.7 degrees after HSL, but increased to 8.8±11.6 degrees after DRFT. Groups D and H had statistically significant reduction in maximum knee flexion in swing after HSL (P<0.05). Maximum knee flexion in swing was statistically significantly reduced in the D group after DRFT (P<0.05), but the C group was not statistically different from preoperative after DRFT (P>0.05). The C and D groups had similar total knee excursion postoperatively. The H group had less knee excursion than the other 2 groups, but it was not significant. **CONCLUSIONS:** The group that had DRFT concomitantly with HSL maintained maximum knee flexion in swing phase postoperatively. Although the group that had delayed DRFT had a reduction in maximum knee flexion after isolated HSL, gains in swing phase motion were achieved after delayed DRFT (comparable to that of the simultaneous group). **LEVEL OF EVIDENCE:** Level II.

[PMID: 26192881](#)

5. *J Pediatr Nurs.* 2015 Jul 17. pii: S0882-5963(15)00215-8. doi: 10.1016/j.pedn.2015.05.027. [Epub ahead of print]

Physical Activity Among Adolescents with Cerebral Palsy: An Integrative Review.

Koldoff EA, Holtzclaw BJ.

Physical activity is necessary for optimum physical and psychosocial health in the general population. It is even more important for adolescents who struggle with impairments that limit motor function. Recommendations for best practice are needed as adolescents transition into adulthood. **PURPOSE:** An integrative review was performed to determine the state of the science regarding 1) what factors impact physical activity in adolescents with cerebral palsy, and 2) how the needs of this population have been addressed regarding physical activity. **SEARCH STRATEGY:** A literature search of MEDLINE, CINAHL, and PubMed was conducted using the terms cerebral palsy, mobility or activity, and adolescents. Exclusion criteria were surgical or pharmacological interventions. **RESULTS OF THE LITERATURE SEARCH:** Descriptive and intervention studies were included and evaluated for purpose, design, and key findings.

SYNTHESIS OF EVIDENCE: Correcting the decline of physical activity in adolescents with CP may carry benefits over into adulthood. There are few studies that adapt physical activity to age and level of impairment. Several studies support approaching physical activity from a social model, focusing on participation of the person in the context of environment. There is a lack of research incorporating family-centered care. Many study designs are shallow and lack the proper instruments for assessing outcomes. **IMPLICATIONS FOR PRACTICE:** Home and community based interventions need to be developed that are individualized. More studies are needed with stronger research designs and better instruments in order to generalize results for practice.

[PMID: 26195302](#)

6. *Res Dev Disabil.* 2015 Jul 18;45-46:1-13. doi: 10.1016/j.ridd.2015.07.005. [Epub ahead of print]

Computer and microswitch-based programs to improve academic activities by six children with cerebral palsy.

Stasolla F, Damiani R, Perilli V, D'Amico F, Caffò AO, Stella A, Albano V, Damato C, Leone AD.

This study was aimed at extending the use of assistive technology (i.e. microswitch such as a pressure sensor, interface and laptop) with a new setup, allowing six children with cerebral palsy and extensive motor disabilities to improve their academic activities during classroom. A second objective of the study was to assess a maintenance/generalization phase, occurring three months after the end of the intervention, at participants' homes, involving their parents. A third purpose of the study was to monitor the effects of the intervention program on the indices of positive participations (i.e. constructive engagement) of participants involved. Finally, a social validation procedure involving 36 support teachers as raters was conducted. The study was carried out according to a multiple probe design across behaviours followed by maintenance/generalization phase for each participant. That is, the two behaviours (i.e. choice among academic disciplines and literacy) were learned first singly, then combined together. Results showed an increasing of the performances for all participants involved during intervention phases. Furthermore, during maintenance phase participants consolidated their results. Moreover, positive participation augmented as well. Support teachers, involved in the social validation assessment, considered the combined intervention as more favourable with respect to those singly learned. Clinical, educational and practical implications of the findings are discussed.

[PMID: 26196086](#)

7. *Open Neurol J.* 2015 Jun 26;9:45-52. doi: 10.2174/1874205X01509010045. eCollection 2015.

Cerebral Palsy: A Lifelong Challenge Asks for Early Intervention.

Panteliadis CP, Hagel C, Karch D, Heinemann K.

One of the oldest and probably well-known examples of cerebral palsy is the mummy of the Pharaoh Siptah about 1196-1190 B.C., and a letter from Hippocrates (460-390 B.C.). Cerebral palsy (CP) is one of the most common congenital or acquired neurological impairments in paediatric patients, and refers to a group of children with motor disability and related functional defects. The visible core of CP is characterized by abnormal coordination of movements and/or muscle tone which manifest very early in the development. Resulting from pre- or perinatal brain damage CP is not a progressive condition per se. However, without systematic medical and physiotherapeutic support the dystonia leads to muscle contractions and to deterioration of the handicap. Here we review the three general spastic manifestations of CP hemiplegia, diplegia and tetraplegia, describe the diagnostic procedures and delineate a time schedule for an early intervention.

[PMID: 26191093](#)

8. Dev Med Child Neurol. 2015 Jul 21. doi: 10.1111/dmcn.12854. [Epub ahead of print]

Brain structural and microstructural alterations associated with cerebral palsy and motor impairments in adolescents born extremely preterm and/or extremely low birthweight.

Kelly CE, Chan L, Burnett AC, Lee KJ, Connelly A, Anderson PJ, Doyle LW, Cheong JL, Thompson DK; Victorian Infant Collaborative Study Group.

AIM: To elucidate neurobiological changes underlying motor impairments in adolescents born extremely preterm (gestation <28wks) and/or with extremely low birthweight (ELBW, <1000g), our aims were the following: (1) to compare corticospinal tract (CST) microstructure and primary motor cortex (M1) volume, area, and thickness between extremely preterm/ELBW adolescents and a comparison group with normal birthweight (>2499g); (2) to compare CST microstructure and M1 volume, area, and thickness between extremely preterm/ELBW adolescents with cerebral palsy (CP), motor impairment without CP, and no motor impairment; and (3) to investigate associations between CST microstructure and M1 measures. **METHOD:** This study used diffusion and structural magnetic resonance imaging to examine the CST and M1 in a geographical cohort of 191 extremely preterm/ELBW adolescents (mean age 18y 2.4mo [SD 9.6mo]; 87 males, 104 females) and 141 adolescents in the comparison group (mean age 18y 1.2mo [SD 9.6mo]; 59 males, 82 females). **RESULTS:** Extremely preterm/ELBW adolescents had higher CST axial, radial, and mean diffusivities and lower M1 thickness than the comparison group. Extremely preterm/ELBW adolescents with CP had higher CST diffusivities than non-motor-impaired extremely preterm/ELBW adolescents. CST diffusivities correlated with M1 volume and area. **INTERPRETATION:** Extremely preterm/ELBW adolescents have altered CST microstructure, which is associated with CP. Furthermore, the results elucidate how CST and M1 alterations interrelate to potentially influence motor function in extremely preterm/ELBW adolescents.

[PMID: 26195287](#)

Prevention and Cure

9. Best Pract Res Clin Obstet Gynaecol. 2015 Jun 23. pii: S1521-6934(15)00105-4. doi: 10.1016/j.bpobgyn.2015.06.004. [Epub ahead of print]

Introduction: Why is intrapartum foetal monitoring necessary - Impact on outcomes and interventions.

Ayres-de-Campos D.

Maintaining maternal oxygen supply is essential for foetal life, and labour constitutes an increased challenge to this. Good clinical judgement is required to evaluate the signs of reduced foetal oxygenation, to diagnose the underlying cause, to judge the reversibility of the condition and to determine the best timing for delivery. The main aim of intrapartum foetal monitoring is to identify foetuses that are being inadequately oxygenated, enabling appropriate action before the occurrence of injury. It is also to provide reassurance in cases of adequate foetal oxygenation, and thus to avoid unnecessary obstetric intervention. Poor foetal oxygenation is diagnosed by documenting metabolic acidosis in the umbilical cord immediately after birth or in the newborn circulation during the first minutes of life. However, most newborns recover quickly, and they do not develop relevant short- or long-term

complications. Hypoxic-ischaemic encephalopathy is the short-term neurological dysfunction caused by inadequate intrapartum foetal oxygenation, and cerebral palsy of the spastic quadriplegic or dyskinetic types is the long-term neurological complication most commonly associated with it. Although there is insufficient evidence from randomised controlled trials to demonstrate that any form of intrapartum foetal monitoring reduces the incidence of adverse outcomes, reports from the clinical setting have documented a decrease in metabolic acidosis, hypoxic-ischaemic encephalopathy and intrapartum death over the last decades. It may be difficult to demonstrate the benefit of diagnostic techniques in complex environments such as the labour ward, but a reduction in the incidence of adverse clinical outcomes constitutes important evidence that intrapartum foetal monitoring makes a difference.

[PMID: 26189688](#)

10. Cell J. 2015 Summer;17(2):389-94. Epub 2015 Jul 11.

Improved Quality of Life in A Case of Cerebral Palsy after Bone Marrow Mononuclear Cell Transplantation.

Sharma A, Sane H, Kulkarni P, D'sa M, Gokulchandran N, Badhe P.

Cerebral palsy (CP) is a non progressive, demyelinating disorder that affects a child's development and posture and may be associated with sensation, cognition, communication and perception abnormalities. In CP, cerebral white matter is injured resulting in the loss of oligodendrocytes. This causes damage to the myelin and disruption of nerve conduction. Cell therapy is being explored as an alternate therapeutic strategy as there is no treatment currently available for CP. To study the benefits of this treatment we have administered autologous bone marrow mononuclear cells (BMMNCs) to a 12-year-old CP case. He was clinically re-evaluated after six months and found to demonstrate positive clinical and functional outcomes. His trunk strength, upper limb control, hand functions, walking stability, balance, posture and coordination improved. His ability to perform activities of daily living improved. On repeating the Functional Independence Measure (FIM), the score increased from 90 to 113. A repeat positron emission tomography-computed tomography (PET-CT) scan of the brain six months after intervention showed progression of the mean standard deviation values towards normalization which correlated to the functional changes. At one year, all clinical improvements have remained. This indicated that cell transplantation may improve quality of life and have a potential for treatment of CP.

[PMID: 26199918](#)