

Spastic diplegia

Spastic [diplegia](#), historically known as Little's Disease, is a form of [cerebral palsy](#) (CP) that is a chronic neuromuscular condition of [hypertonia](#) and [spasticity](#)—manifested as an especially high and constant “tightness” or “stiffness”—in the muscles of the lower extremities of the human body, usually those of the legs, hips and pelvis.

Doctor William John Little's first recorded encounter with cerebral palsy is reported to have been among children who displayed signs of spastic diplegia.

Single-event multilevel surgery (SEMLS) approach is regarded as the golden standard in developed countries to improve gait and functional mobility in children with cerebral palsy (CP). However, this approach is not always feasible in developing countries. Therefore, orthopedic surgery based on an interval surgery approach (ISA) is still commonly used in developing countries, although little is known about the long term outcomes of an ISA. Therefore, the aim of this study was to describe the gait patterns of adults with CP, who have been treated with ISA, which started more than 15 years ago.

MATERIALS AND METHODS: Thirty adults with CP and spastic diplegia, who received ISA treatment 21.6-33.7 years ago, were recruited for this study and participated in three-dimensional gait analysis. Twenty kinematic and nondimensional temporal-distance parameters were captured, while the overall gait deviation index (GDI) was also calculated. Data of the adults with CP were compared to normative data of typically developing (TD) adults.

RESULTS: Although all adults with CP were still ambulant, their gait parameters significantly differed from TD adults, with a lower GDI in the adults with CP. The CP gait patterns were characterized by excessive hip flexion and hip internal rotation as well as a stiff-knee gait.

CONCLUSION: Although different to TD adults, the gait patterns observed in the adult with CP treated with ISA is in line with other studies. Gait patterns suggest that derotation osteotomies potentially could have improved the long term gait patterns. Although SEMLS might be the preferred treatment method, potentially resulting in better outcomes, ISA can also be used to treat children with CP in developing countries as India and South Africa, where a SEMLS approach is not always feasible ¹⁾.

36 [children](#) (age 4-13 y) with [spastic diplegia](#) (gross motor classification system level I (n=14), II (n=15) and III (n=7) were included retrospectively from the database of the VU University Medical Center [Amsterdam](#). Children underwent [selective dorsal rhizotomy](#) (SDR) between January 1999 and May 2011. Patients were included if they received clinical [gait](#) analysis before and five years post-SDR, age >4 years at time of SDR and if brain MRI-scan was available.

Overall gait quality was assessed with [Edinburgh visual gait score](#) (EVGS), before and five years after SDR. In addition, knee and ankle angles at initial contact and midstance were evaluated. To identify predictors for gait improvement, several factors were evaluated including: functional mobility level (GMFCS), presence of white matter abnormalities on brain-MRI, and selective motor control during gait (synergy analysis).

Overall gait quality improved after SDR, with a large variation between patients. [Multiple linear](#)

[regression](#) analysis revealed that worse score on EVGS and better GMFCS were independently related to gait improvement. Gait improved more in children with GMFCS I & II compared to III. No differences were observed between children with or without white matter abnormalities on brain MRI. Selective motor control during gait was predictive for improvement of knee angle at initial contact and midstance, but not for EVGS.

Functional mobility level and baseline gait quality are both important factors to predict gait outcomes after SDR. If candidates are well selected, SDR can be a successful intervention to improve gait both in children with brain MRI abnormalities as well as other causes of spastic diplegia ²⁾.

1)

Langerak NG, Tam N, du Toit J, Fieggen AG, Lamberts RP. Gait Pattern of Adults with Cerebral Palsy and Spastic Diplegia More Than 15 Years after Being Treated with an Interval Surgery Approach: Implications for Low-Resource Settings. *Indian J Orthop.* 2019 Sep-Oct;53(5):655-661. doi: 10.4103/ortho.IJOrtho_113_19. PubMed PMID: 31488936; PubMed Central PMCID: PMC6699209.

2)

Oudenhoven LM, van der Krogt MM, Romei M, van Schie PEM, van de Pol LA, van Ouwerkerk WJR, Harlaar Prof J, Buizer AI. Factors associated with long-term improvement of gait after selective dorsal rhizotomy. *Arch Phys Med Rehabil.* 2018 Jul 4. pii: S0003-9993(18)30442-8. doi: 10.1016/j.apmr.2018.06.016. [Epub ahead of print] PubMed PMID: 29981315.

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