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Psoas tenotomy outcomes in ambulatory spastic diplegic children with cerebral palsyA.-L. Simon^{a,*}, A. Presedo, B. Ilharreborde, K. Mazda, G.-F. Penneçot

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E-mail address: annelaure_simon@hotmail.com**Keywords:** Spastic cerebral palsy; Gait analysis; Hip flexion contracture; Psoas tenotomy**Introduction.**– Lack of hip extension due to psoas contracture in ambulatory spastic diplegic children with cerebral palsy is frequent and impedes forward progression. The aim of the study was to evaluate psoas tenotomy outcomes on hip range of motion and on deambulation.**Materials and methods.**– Twelve children with spastic cerebral palsy, GMFCS II and III, were retrospectively reviewed. Each child had a psoas tenotomy during a single event multi-level surgery between 2005 and 2008; nine had a bilateral procedure. The mean follow-up was 3.4 + 0.55 years. Data collected in pre- and in post-operative were hip range of motion on physical examination and on 3D-gait analysis data: maximal hip extension, pelvic obliquity range of motion, gait velocity, step length and Gillette Gait Index (GGI). The Wilcoxon Test was used for statistical analysis.**Results.**– On physical examination hip flexion contracture was significantly ($p < 0.05$) improved ($14.6^\circ \pm 2.1^\circ$), as well as maximal hip extension and the GGI with respectively $6.21 \pm 1.55^\circ$, and 143 ± 28 . Gait velocity and step length were not significantly improved. Pelvic obliquity range of motion was decreased, increased or unchanged in 46, 33 and 21% of the cases.**Discussion.**– The psoas tenotomy improved physical and kinematic hip extension. At a single event multi level surgery, GGI's improvement cannot be attributed to this procedure alone. Pelvic obliquity range of motion was improved in half of the cases and resulted from both hamstrings lengthening and psoas tenotomy procedure. The results of the current study are similar with those from Truong et al. [1] about intramuscular psoas lengthening.**Reference**[1] Truong WH, et al. Evaluation of a conventional selection criteria for Psoas Lengthening for Individuals With Cerebral Palsy- A Retrospective, Case-Controlled Study. *J Pediatr Orthop* 2011;31(5):534–40.<http://dx.doi.org/10.1016/j.rehab.2013.07.771>

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Twenty-five years of selective dorsal rhizotomy based on clinical observations instead of intraoperative electrophysiological monitoring: The Sainte-Justine hospital experienceG. Letellier^{a,*}, A. Parent^b, M. Raison^c, P. Marois^b, C. Mercier^b, L. Crevier^b, M. Laberge^b, L. Ballaz^b^a Réanimation et soins intensifs pédiatriques, rééducation neurologique et ventilatoire, CHU Raymond-Poincaré, 104, boulevard Raymond-Poincaré, 92380 Garches, France^b CHU Sainte-Justine (CRME), Montréal, QC, Canada^c École polytechnique, Montréal, QC, Canada

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E-mail address: guy.letellier@rpc.aphp.fr**Keywords:** Spasticity; Dorsal rhizotomy; Neurosurgery; Child; Cerebral palsy; EVGS; Gait**Introduction.**– Selective dorsal rhizotomy (SDR) is a surgery performed between spinal nerves L2 and S2 to reduce lower limb muscle spasticity. In children with diplegia cerebral palsy (CP), this intervention is generally implemented to improve gait. Usually, the choice of the level and the amount of rootlets cut is based on the muscle electrophysiological response evaluated during the surgery. However, this method remains criticized to assess muscular spasticity. Since 25 years in our hospital centre, the levels and ratios of rootlets cut have exclusively been defined on the basis of clinical observations resulting in a less invasive intervention. To date, SDR has been practiced in 276 children. The aim of this retrospective study was to describe the decision process based

on patient clinical evaluation, and to report the effectiveness of this method to improve gait.

Methods.– Since the late 80's, patients' eligibility to the surgery, the spinal cord level and the ratio of rootlets cut have been determined by a single physiatrist. His decision tree is based on clinical evaluations. The Edinburgh Visual Gait Score (EVGS) was used to evaluate gait. Video recordings were analyzed in 40 children with spastic diplegia CP before and two years after SDR. Student Test was used to compare means.**Results.**– The total EVGS scores before and two years after SDR are significantly different ($p < 0.001$). Children showed significant differences before and after SDR concerning 12 of the 17 EVGS observations. The initial contact, the heel lift, the maximal dorsiflexion in stance and swing, the knee peak extension stance and the knee terminal swing significantly improved after SDR ($p < 0.001$).**Discussion.**– The SDR based on clinical observations improve gait. The decision tree results in an appropriate patient selection and SDR parameter choices. Further studies are needed to compare clinical and electrophysiological-based approaches.<http://dx.doi.org/10.1016/j.rehab.2013.07.772>

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Relationship of muscular coactivation to kinematics during gait in typically developing and hemiplegic cerebral palsy childrenR. Gross^{a,*}, F. Leboeuf^b, B. Perrouin-Verbe^c, O. Rémy-Néris^d, S. Brochard^d^a Service de MPR neurologique, hôpital Saint-Jacques, CHU de Nantes, 85, rue Saint-Jacques, 44093 Nantes, France^b Laboratoire d'analyse du mouvement, CHU de Nantes, Nantes, France^c Service de MPR neurologique, CHU de Nantes, Nantes, France^d Service de médecine physique et de réadaptation, hôpital Morvan, CHRU de Brest, Brest, France

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E-mail address: raphael.gross@chu-nantes.fr**Keywords:** Gait; Cerebral palsy; Muscular coactivation**Introduction.**– Muscular coactivation (CA) is a physiological phenomenon, allowing stability of a joint, but also a possible pathological motor sign within the pyramidal syndrome (abnormal reciprocal inhibition). Children with cerebral palsy (CP) exhibit more CA than typically developing (TD) children during gait. We investigated the link between CA and kinematics during gait in TD and CP children, hypothesizing that CA restrains the range of motion (ROM) in children with CP.**Patients and methods.**– The gait of 10 TD and 10 hemiplegic CP children was explored using dynamic EMG of five muscles in both legs (vastus medialis, rectus femoris, semitendinosus, tibialis anterior and soleus) and kinematics obtained from a ViconTM system. The eight following movements were defined using the values from Benedetti et al. [1]: hip: flexion and extension; knee: loading response flexion, extension in stance, and flexion in swing; ankle: dorsiflexion during stance, plantarflexion in late stance, and dorsiflexion during swing. For each of these movements, the corresponding CA index from the muscle couple was computed using the Falconer method [2]. A linear model was used to test the link between gait speed, CA index, and ROM.**Results.**– For almost all the movements investigated, the goodness of fit with the model was good. In TD children, the ROM increased with gait speed and was negatively influenced by the CA. Some differences were found in CP children for kinematics at the knee and ankle.**Discussion and conclusion.**– Gait speed and coactivation influence the ROM during gait, with CA restraining the ROM. Some movements only are specifically influenced by CA in hemiplegic CP children.**References**[1] Benedetti MG, Catani F, Leardini A, Pignotti E, Giannini S. Data management applications in gait analysis for clinical. *Clin Biomech* 1998;13:204–15.
[2] Falconer K. Quantitative assessment of co-contraction at the ankle joint in walking. *Electromyogr Clin Neurophysiol* 1985;25:135–49.<http://dx.doi.org/10.1016/j.rehab.2013.07.773>