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Institutet**

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Movement pattern, power generation and well-being in children and young adults with spastic unilateral cerebral palsy

Akademisk avhandling

som för avläggande av medicine doktorexamen vid Karolinska Institutet offentligen försvaras i Skandiasalen, Astrid Lindgrens Barnsjukhus, Stockholm

Fredagen den 1 april, 2011, klockan 09.00

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Stockholm 2011

ABSTRACT

Patients with unilateral cerebral palsy (CP) all walk, most of them without great difficulty and without assistive devices. However, their walk tends to catch the eye because of abnormal, often asymmetrical movement in the upper and lower extremities. Although the impairment is limited and the involvement often is considered mild the deviation is apparent in both movement pattern and anatomy, with one leg being smaller and shorter.

Some of the patients have a more severe CP diagnosis which can include epilepsy, learning and psychological problems apart from the motor function impairment with spasticity, decreased motor control, co-contraction, muscle and joint contractures and muscle weakness and deformities. The expression of the static brain injury varies tremendously between individuals and changes with growth, which makes prognosis and setting of long term goals difficult.

Nevertheless many of the children, teenagers and young adults with unilateral CP manage well; for them treatment is seldom considered or recommended. On the other hand the knowledge about possibilities and available treatment options is limited. We consider these patients high functioning in relation to other groups with CP and have not paid much attention to their possible concerns and wish to normalize their movement pattern.

In these studies the goal was to explore different dynamic changes in movement pattern of the upper and lower extremities, explore anatomical changes in terms of muscle volume and leg length discrepancy and finally assess well-being with respect to self-esteem, sense of coherence and quality of life. Specifically we wanted to study variables that can help in the classification of movement pattern and help identify and separate between primary deviations caused by the brain injury and deviations arising from compensation mechanisms on both the involved and non-involved side.

The widely used Winters classification, using Gait analysis, was unable to classify 23% of children with a mean age of 8.1 years (3.6-19.8 years). For these patients we created a new complementary type to the Winters classification, type 0, describing mild impairment. Patients move between the classification types over time and with treatment. Concentric muscle work is redistributed from the ankles joints to the hip extensors in children on both the involved and non-involved side and in older patient groups, mean age 17.6 years (13.0-24.0 years) on the involved side. The amount of hip extensor work exceeds that in the control group. There was significant decrease of muscle volume on the involved side compared to the non-involved side, with more pronounced changes distally in the limb, on Magnetic resonance imaging assessment. There was a significant leg length discrepancy in the tibia, talus and calcaneus. Patients scored lower in self-esteem and quality of life assessment than the control group and there was a significant correlation between arm posture deviation and self-esteem.

In summary, with the new type 0 as a complement of the Winters sagittal plane kinematic classification, other variables can be useful when evaluating high functioning patients with unilateral CP. Advanced quantitative objective measurements such as Gait analysis and Magnetic resonance imaging may be useful to develop and evaluate rational treatment protocols.

The impact on self-esteem and quality of life should not be underestimated in teenagers and young adults with spastic unilateral CP