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Title
Motor skills improvement evaluation of cerebral palsy child with lower limbs spasticity by application of variable abduction hip orthosis

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Summary
Application of variable abduction hip orthosis (VAHO) by cerebral palsy (CP) child with lower limbs spasticity can improve motor skills: child’s sitting, posture, walking, walking distance and reduce scissoring gait immediately after application of VAHO and after 6 months of VAHO usage.

Introduction
VAHO has been in application for more than 20 years and it is recommended for motor skills improvement in children with spastic palsy of lower limbs of any etiology and prevention of hip displacement in CP children; however, there are not many published clinical studies confirming this statement. Study objectives are evaluating efficiency of orthotic fitting in CP children with lower limb spasticity by VAHO application, using clinical assessment parameters witch describe motor skills; objectively determining the difference in manifestation of motor disorder without VAHO, after application of VAHO and after 6 months of VAHO usage.

Methods
Clinical examination and filling up questionnaire to evaluate motor skills using VAHO (the questionnaire is a part of instructions for VAHO application), obtained data analysis. In 10 children (6 boys and 4 girls, age of 4 to 12) we observed parameters: improvement of child’s sitting, posture, walking, scissoring gait and walking distance in meters without orthosis, after VAHO application, and after 6 months of VAHO usage.
Statistical analysis was conducted by Wilcoxon test of matched pairs.

Results

In 80% of children studied, indication for VAHO application has been justified because it led to motor skills improvement. In 20% of the cases, application was discarded. We found statistically significant difference in motor skills improvement of children using VAHO comparing to their motor skills without VAHO, which was evident also after 6 months of application. Immediately after the application of VAHO, all children have had improvement in posture while sitting ($p = 0.005$), reduced scissoring gait ($p = 0.005$) and increase of walking distance in meters ($p = 0.005$) - statistically very significant differences. In all children there was an improvement of independent standing ($p =$ of 0.018) and walking ($p =$ of 0.018) - statistically moderately significant differences. Comparing the examined parameters in 8 subjects immediately after fitting VAHO and after 6 months of usage, the same improvement was still present comparing with status without orthosis, while in the walking distance in meters after 6 months there was a further increase – statistically moderately significant differences ($p = 0.018$).

Conclusion

VAHO is intended for relatively small group of users with specific orthotic needs. The study confirmed the efficacy of VAHO application and improvement of motor skills in CP children with lower limbs spasticity. When assessing the indication for use, experience of medical team is essential, as well as parent / guardian co-operation in order to avoid unsuccessful orthotic fitting and unnecessary costs for insurers. There is no significant number of published papers with assessment of the effectiveness in VAHO application and this study can help clinicians deciding about orthotic solution in children with lower limbs spasticity. It is necessary to perform wider standardized examination in several institutions over a longer period of time and with a large number of subjects conducted by educated and experienced examiners in the application of VAHO in order to expand and improve knowledge of the effects of orthosis.

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Image: Table 1 Clinical parameters_2480.png

Table 1: Clinical parameters without orthosis, in VAHO and after 6 months using VAHO

Examinee: Number, gender, age,GMFCS	sitting			standing			walking			Scissoring gait			Walking distance in meters		
	Without orthosis	In VAHO	In VAHO aft. 6 months	Without orthosis	In VAHO	In VAHO aft. 6 months	Without orthosis	In VAHO	. In VAHO aft. 6 months	Without orthosis	In VAHO	In VAHO aft. 6 months	Without orthosis	In VAHO	In VAHO aft. 6 months
1. m, 7 y., III	3	2	/	2	2	/	3	2	/	da	ne	/	8	12	/
2. m, 7 y., III	2	1	/	2	2	/	3	2	/	da	ne	/	10	20	/
3. f,4 y., IV	3	2	1	3	3	3	3	3	3	da	ne	ne	2	3	3
4. m,12 y., IV	3	2	2	3	2	2	3	2	2	da	ne	ne	2	6	30
5.m,11 y., IV	3	2	2	3	2	2	3	2	2	da	ne	ne	3	6	15
6.m,7 y., II	2	1	1	2	1	1	1	1	1	da	ne	ne	300	400	500
7.f,8 y., IV	3	2	1	3	2	1	3	2	2	da	ne	ne	4	12	20
8.f,11 y.,III	2	1	1	2	1	1	2	1	1	da	ne	ne	4	8	10
9.f,11 y., III	2	1	1	2	1	1	2	1	1	da	ne	ne	10	15	20
10.m,7 y., III	2	1	1	2	1	1	2	1	1	da	ne	ne	10	15	25

Interpretation:
Sitting – posture: upright 1, slightly bent 2, very bent 3
Standing: independently 1, with support orthopedic device or stick to the wall 2, with the help of other person 3
Walking: independently without support1, with support of orthopedic device 2, with the help of other person 3