MODERN ASPECTS OF REHABILITATION OF PATIENTS WITH DISTURBANCE IN POSTURAL BALANCE

S.A. Volovets[1], E. Yu.Sergienko[2], L.Yu. Darinskaya[1], Yu.A. Yashinina[1], I.V. Zhitareva[2], T.I. Panova[2]

[1] *L. Schvetsova Moscow Practical Research Centre for Physical and Social Rehabilitation of Disabled Persons, Moscow, Russia*

[2] *Pirogov Russian National Research Medical University, Moscow, Russia*

Svetlana A. Volovets, *Prof., PhD, Neurologist, Director of the Centre*

Elena Yu. Sergienko, *Prof., Sport-Therapist, Director of Department for Reabilitology and Physiotherapy*

Yulia A. Yashina, *Neurologist, Vice-Director of the Centre*

Lyubov Yu. Darinskaya, *Sport Therapist, Physiotherapist*

Tatiana I. Panova, *MD, PhD Sport Therapist, Assistant Professor of Department for Reabilitology and Physiotherapy*

Irina V. Zhitareva, *MD, PhD, Assistant Professor of Department of Medical Cybernetics and Informatics*

INTRODUCTION

Among all kinds of vascular disease the acute impairment of cerebral circulation (AICC) still remains as a one of most serious medical and social issue. In majority of patients suffered from AICC (81,2%) there are movement and coordination problems leading to disability, reducing the quality of life [1, 2]. Lokomotor disorders in post AICC patients sufficiently increase the risk of falls while standing and walking. In the acute stage of the stroke falls are observed in 14% of patients, during rehabilitation among 73%, in 8% of this amount with fractures [2, 3, 4].

Therefore in the treatment of post-stroke patients a great attention is paid to rehabilitation programs aimed at correction of movement stereotypes, restoring of static and dynamic balance.

Aim:

to evaluate the efficacy of a system to restore static and dynamic balance in patients with disturbance in postural balance after AICC.

MATERIALS AND METHODS

45 patients aged from 36 to 73 years old with disturbance in postural balance after AICC in the pool of middle cerebral artery on the second stage of medical rehabilitation entered the study. Gender of the respondents was distributed as 24(53,3%) men and 21(46,7%) women. Illness duration was from 5,5 to 11 months. 24 patients with disturbance in postural balance after AICC comprised the main group and 21 patients — the group of comparison.

The patients of both groups could be well correlated on gender, age, the seriousness of the main illness, the neurological manifestation, motor and coordination disorders.

All the patients involved in the study underwent: symptomatic drug therapy, physiotherapy (magnet therapy, paraffin therapy, massage of the spastic limbs and reflection zones, coordination physical therapy, cycling biomechanics for upper and lower limbs). Additionally the patients of the main group received a rehabilitation course with the use of system «Balance tutor». General time of rehabilitation in the main and the control group was the same.

In the course of the study functional scales estimating static and dynamic balance, walking function, fall risks (Berg Balance Scale, Dynamic Gait Index, Tinetti Scale) were applied to assess the efficacy of the methods. An examination was carried on before and after the course.

Data processing was performed with Statistica 10,0 and Microsoft Excel 2007.

RESULTS

Berg Balance Scale was used to asess the balance and independent walking ability (without support or assistance). After the treatment the performance on the Berg Balance Scale r= 44,63±0,5 what is statistically different from the performance before treatment r= 37,04±0,4 ($p<0,05$). In the control group there was a tendency to improvement of the balance as an increase from r= 36,8±0,5 before the rehabilitation up to r= 40,7±0,5 after the rehabilitation. Before the rehabilitation course 19 (79,2%) patients were in the group «walking with support» 5 (20,8%) could walk independently; in the control group 17 (80,9%) patients walked with support. After the correction of locomotor functions only 2 (8,3%) patients of the main group needed a support while walking, 17 (70,9%) shifted from the group «walking with support» to the group of independent walking; in the control group 10 (47,6%) patients пациентам required support while walking.

Walking function and risk of falls while walking was assessed with the help of Dynamic Gait Index. Before the treatment 100 % of the patients from both group referred to a group of high risk of fall. In the main group of patients the result after the course of rehabilitation was r= 21,09±0,25, which has a statistical significance ($p<0,05$) compared to the result before the rehabilitation r= 14,9±0,23. In the control group a positive dynamic was reported however without a statistical significance: before the rehabilitation course performance of Dynamic Gait Index was r=14±0,3, after — 17,5±0,42. After the treatment with the above mentioned medical technology only in 3(12,5%) patients of the main group a high risk of fall kept unchanged. All re other patients (21 people, 87,5%) shifted from group of high risk of fall to the group of a low risk of fall while walking. At the same time in the control group only 10 (47,6%) patients after rehabilitation showed a low risk of fall while walking.

Functional Tinetti Scale enabled to assess success in performance of concrete motor tasks (both static and dynamic) as well as a degree of the postural disorders.

Comparing the results in the main group an evident improvement in steadiness and the gait on Tinetti Scale was reported with evident increase in the length of a step, more stable walking, lesser deviation from the line, which shows a positive effect on dyna-mic indicators of the balance ($p<0,05$). Before beginning of the rehabilitation the performance of gait and steadiness were as follows: 11,6±0,21 and 15,8±0,27; in the control group — 11,4±0,2 and 15,5±0,25 which corresponded to a moderate manifestation of gait and steadiness disorders in both groups. By the end of the rehabilitation course a positive result was observed in both groups with more distinct dynamic in the main group: the performance of gait was assessed with 14,9±0,23, steadiness — 21,3±0,35, which corresponded to a light degree of disorder according to the assessment criteria. In the patients of the control group after the rehabilitation the gait and steadiness improved but remained in the degree corresponding to moderate disorders of gait and steadiness and came to 12±0,25 и 17,5 ±0,29.

CONCLUSION

Thus, due to the conducted study the efficacy of application of the system for restoration of static and dynamic balance «Balance tutor» was proved, which confirms the the feasibility of its inclusion in a complex rehabilitation of AICC patients with disturbance in postural balance.

REFERENCES

1. **Damulin I.V., Kononenko E.V.** Motor Disorders after Stroke: pathogenetic and therapeutic aspects // Consilium medicinum. – 2007; 2: 86–91.
2. **Prokopenknk S.V., Ondar V.S., Abroskina M.V.** Syndrom of Central Hemiparesis and Disturbance of Balance // Herald of Restorative Medicine – 2012; 5: 23–28.
3. **Elizabeth L. Inness, Avril Mansfield, Louis Biasin, Karen Brunton, Mark Bayley, William E. McIlroy.** Clinical implementation of a reactive balance control assessment in a sub-acute stroke patient population using a 'lean-and-release' methodology // Journal Gait & Posture. – 2015; 41: 529–534.
4. **Roos M. A.** The structure of walking activity in people after stroke compared with older adults without disability: a cross-sectional study // Phys. Ther. – 2012; 92 (9). – P. 1141–1147.