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Overactivity of the less affected side in patients with acute ischemic stroke

Summary

Introduction:

The observation of patients in the acute phase of stroke during the period from the beginning of hospitalization to the moment of standing up to high positions allowed to select a group of patients whose spontaneous motor activity stood out from the typical clinical picture of the hemiplegia syndrome. It has been noticed that patients from this group have tendency to shift the body weigh toward more affected side which makes it more difficult for them to develop a stable sitting position and then standing. An additional symptom noticed in these patients, that makes the re-education of postural function difficult, was the tendency to move the upper limb and / or the lower limb (not covered by the neurological syndrome). To the best of the researchers' knowledge, there is no study with such an approach to the issue of trunk instability in the acute phase of stroke.

Aims of this study

The following aims were set in this paper:

• describe and characterize the phenomenon of overactivity of less affected side (OLAS) in patients with acute ischemic stroke,

• select predictive symptoms for the occurrence of a typical asymmetry and instability of the trunk in a sitting position,

• determine whether trial therapy can be a diagnostic criterion for OLAS,

• select neurological symptoms that coexist with OLAS,

• develop the patient evaluation questionnaire.

Material and methods.

The research was carried out in the years 2020-2021 at the Department of Neurology of the Faculty of Medical Sciences of the Medical University of Warsaw, located at the Bielański Hospital. The research process collected data from N = 222 people, including 125 women (56%) and 97 men (44%). The average age of the patients was 71.82 ± 14.27 years and ranged from 29 to 99 years. Patients admitted to the Department of Neurology, diagnosed with first-time ischemic stroke, were divided into 3 groups depending on their symptoms.

- 77 patients who, on the first day of the physiotherapeutic evaluation, showed a mild severity of neurological syndrome were qualified to group A.

• 109 patients were qualified to group B, who in the first day of the physiotherapeutic evaluation showed a lateralization of the neurological syndrome regarding muscle weakness, superficial and / or deep sensory disturbances, changes in muscle tone.

• 36 patients were qualified to the N + group, in whom – part from the lateralization of the neurological syndrome regarding muscle weakness, superficial and / or deep sensation disorders, changes in muscle tone, on the first day of the physiotherapeutic evaluation – at least one motor behavior characteristic of OLAS was observed on the side not covered by the syndrome neurological and/or typical asymmetry.

Study design and methodology

Patients were assessed using the original evaluation questionnaire. Parameters such as weakness in the muscles of the trunk and limbs, deep and superficial sensation of the affected limbs muscle tone in the limbs, hemianopia and information on the occurrence of symptoms typical of OLAS were assessed. Moreover, it was marked on which day of hospitalization the patient was first vertically upright to a sitting and standing position. The patients underwent standard therapy. When the patient demonstrated the symptoms of OLAS in a higher position (minimum sitting position), trial therapy was performed (based on the principles of the neurophysiological concept of NDT-Bobath). If such stimulation caused the patient to regain symmetry, he was designated as OLAS and the patient was included in the statistical analysis as such.

Results:

Among 222 patients from the study group, 77 (35%) were subgroup A. None of the patients from subgroup A had finally presented OLAS. Patients from subgroup B constituted 49% of all patients (n = 109 patients). In this subgroup, OLAS was confirmed in 11 patients (10% of patients from subgroup B). The subgroup N + included 36 people. In the N + subgroup, OLAS was finally found in 30 patients (83% of this subgroup). It was shown that patients with OLAS, compared to patients without OLAS, at baseline presented significantly lower levels of strength upper limb (Me = 0 vs Me = 5), lower limb (Me = 2 vs Me = 5), trunk (Me = 0 vs Me = 5). Me = 87). Moreover, the most common neurological deficits among patients with OLAS at baseline were: decreased muscle tone in upper limb (70.7% vs 35.6%), decreased muscle tone in lower limb (63.4% vs 33.6%), p = 0.0006. Superficial sensation disorders in lower limb (78.9% vs 18.4%) and upper limb (83.3% vs 34.02%) and profound sensation disorders in upper limb (61.5% vs 9.2%) and lower limb (61,5% vs 10.47%) p <0.001. The moment of achieving an active sitting and standing position between patients with OLAS and without OLAS was analyzed. The sitting position was achieved by 71% of people in the OLAS group compared to 93% of people in the group without OLAS, p <0.001. The sitting position was achieved significantly later by patients with OLAS (Me = 6 days) compared to patients without OLAS (Me = 2 days), p <0.001. The standing position was achieved by 37% of the OLAS compared to 88.5% of people in the group without OLAS, p <0.001. Standing position was also taken by patients with OLAS significantly later (Me = 8 days) than by patients without OLAS (Me = 4 days). Additionally, in order to check, whether symptoms typical for OLAS at baseline are important predictors of asymmetry in sitting, the logistic regression was conducted. One-dimensional analysis showed that each of the predictors was statistically significant analyzed separately. Asymmetry in supine increases the risk of occurrence of behaviors typical for OLAS in sitting down 21 times, OR = 21.49; CI95 [7.09-65.09]; Se= 0.74; Sp = 0.88, PPV = 0.58, p <0.001. The tendency to motor activity of less affected upper limb increases the risk of occurrence of behaviors typical for OLAS in sitting 32 times, OR = 31.94; CI95 [9.49-118.28]; PPV = 0.6; Se = 0.81; Sp = 0.88; p <0.001. The tendency to motor activity od unaffected lower limb increases the risk of the occurrence of OLAS in sitting 21 times, OR = 21.38; CI95 [4.29-105.53]; OR = 21,38; CI_{95}, Se=0,8, Sp=0,82, PPV=0,31; p < 0,001. Then, a multivariate model was created using the stepwise method and the final model included 2 predictors: tendency to constantly move upper and lower limb on the less affected side of the baseline.

Conclusions

1. OLAS was defined as instability of the trunk in a sitting position with associated motor activities of less affected limbs.
2. The most common pattern of OLAS in sitting position is asymmetry with the shift of body weight to the more affected side with coexisting activities of the less affected limbs.
3. OLAS is more common in severe stroke patients.
4. Trial therapy may be used to diagnose OLAS.
5. Predictive symptoms of OLAS were distinguished. These include: motor activities of the less affected upper limb, motor activities of the less affected lower limb, and asymmetry in the supine position.
6. To predict the occurrence of OLAS a multidimensional predictive model based on the coexistence motor activities of less affected upper and lower limb was developed.