Diagnosis of postural instability in patients with Parkinson's disease

Tappakhov Alexey, Popova Tatiana, Nikolaeva Tatiana, Konnikova Edilia, Shnayder Natalia, Petrova Marina

M.K. Ammosov North-Eastern Federal University in Yakutsk, Russia

Krasnoyarsk State Medical University named after prof. V. F. Voyno-Yasenesky, Russia

BACKGROUND

Postural balance is the ability to stand upright and perform motor acts without jiggle and falls. It enables the integration of information in the central nervous system received from the visual, vestibular and proprioceptive analyzers. Violations of postural functions are one of the cardinal symptoms of **Parkinson's disease (PD)** - a chronic brain disease characterized by degeneration of the substantia nigra in the midbrain. Postural disorders are one of the most negative factors of PD. It causes a loss of the patient's independence, increases the risk of trauma and significantly increases the degree of disability. In addition to falling postural disorders are characterized by changes in muscle tone, leading to the development of flexion postures ("supplicant posture"), in severe cases, may develop prosternation - pronounced tilt torso forward.

Stabilometry is one of the highly informative methods of studying postural functions.

The purpose of the research is to assess the degree of postural disorders in patients with PD.

MATERIALS AND METHODS

We have examined **30 patients with PD** (average age – 65.97±8,33 years) and **30 volunteers** (average age – 62.5 ± 6.95 years).

Criteria for inclusion in first (main) group: 1) the presence of a verified diagnosis of PD; 2) male and female sex; 3) age of patients from 45 years and older; 4) ability independently (without support) to maintain equilibrium; 5) absence of gross motor and cognitive impairments. *Criteria for exclusion:* 1) Secondary parkinsonism or parkinsonism-plus; 2) inability to maintain balance.

Stabilometry was carried all surveyed persons. Patients with PD were tested in the on-period, when the effect of the antiparkinsonian drugs taken was maximal.

We calculated the average position of the center of pressure (CP) in the frontal and sagittal plane, the velocity of CP, area of statokineziogramm and quotient of Romberg.

RESULTS

Parameter	Patients with PD, M ± SD	Control, M ± SD	p-value
X, EO (mm)	-3.2 ± 13.55	1.88 ± 8.3	0.08
X, EC (mm)	-1.16 ± 12.37	0.88 ± 7.44	0.44
Y, EO (mm)	14.7 ± 30.3	4.3 ± 28.18	0.18
Y, EC (mm)	15.71 ± 30.61	6.51 ± 27.42	0.23
S, EO (mm^2)	409.96 ± 357	222.52 ± 122.83	0.01*
S, EC (mm^2)	387.8 ± 293.78	287.53 ± 231.97	0.15
V, EC (mm/s)	12.3 ± 5.85	9.22 ± 2.35	0.01*
V, EC (mm/s)	15.9 ± 8.08	12.36 ± 5.13	0.04*
QR (%)	167.2 ± 103.6	180.0 ± 112.33	0.65

Notes: X – average position of the center of pressure in frontal plane; Y – average position of the center of pressure in sagittal plane; S – area of statokineziogramm; V – velocity of center of pressure; QR – quotient of Romberg; EO – data in phase "eyes open"; EC – data in phase "eyes close"; * - statistically significant differences.

It was revealed that in PD significantly increases area of statokineziogramm and velocity of CP. Significant differences between the other parameters had not been found. Thus, in patients with PD were found evidence of moderate postural disorders. These results are likely to be related to the study in the on-period when symptoms of PD (slowness of movement and muscular rigidity) minimally.

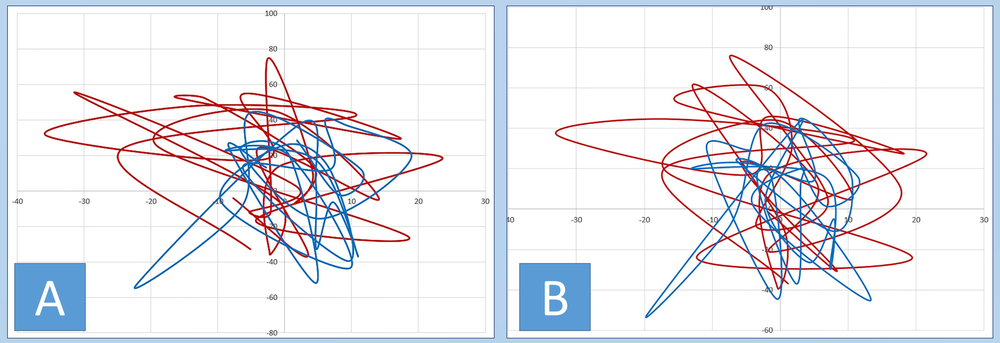


Figure 1. A – stabilometry in phase "eyes open"; B – stabilometry in phase "eyes close". Red lines – PD; blue lines – health control.

CONCLUSION

Stabilometry allows to objectively identify postural disorders in patients with PD. Perspective is the use of a technique for monitoring treatment, as well as the use of tests with biologically feedback as one of the non-drug treatment methods of the disease.

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