Nystagmus/PGS/diagnostics

Nystagmus (from the Greek *nystagmein* - drooping of the head when falling asleep sitting up) is an oscillatory movement of the eyeballs, usually biphasic with a slow and fast component. The slow component is the basic symptom of the so-called *static vestibular imbalance*, which is caused by the asymmetry of the function of the vestibular apparatus, pushing the bulbs to the side of the weaker labyrinth. The *fast component* is a refixation saccade that returns the eye to its starting position. The fast phase is a reflex action generated by the reticular formation of the brainstem (paramedian pontine reticular formation – PPRF – for horizontal saccades and n. rostralis interstitialis fasciculi longitudinalis medialis – riMLF – for vertical and rotational saccades). Rhythmic movement is created by constant repetition of both components of nystagmus.

We arbitrarily determine the **direction of nystagmus** according to the fast component. During the examination, we describe the plane in which the nystagmus beats (oscillates) - it can be horizontal, vertical or rotational. For **peripheral vertigo**, a rhythmic, horizontal-rotational nystagmus is typical, in which we distinguish three quantitative grades, reflecting the degree of asymmetry of the function of both vestibular apparatuses: Grade I appears only when looking in the direction of the fast component, IInd degree even when looking directly (primary position of the bulbs) and IIIrd an extra degree even when looking in the direction of the slow component (looking against the direction of the nystagmus). For peripheral vertigo of labyrinthine origin, this dependence of intensity on the direction of view, the so-called *Alexander's Law*, is typical. This type of nystagmus is also significantly dampened by visual fixation, so it can be accentuated by closing the eyes (we examine by palpation through the eyelids) or by wearing Frenzel glasses, which make fixation impossible (they have magnifying glasses and internal lighting that dazzles the patient).

Nystagmus in vertigo of **central origin** is variable, usually dysrhythmic (larger and smaller amplitude alternates), there is often a vertical component, the direction can also change during the examination. The most common type of central nystagmus is the so-called **regularly changing visual nystagmus**. It is a first-degree nystagmus, always beating in the direction of gaze (when looking to the right, the nystagmus is right-sided, when looking to the left, it is left-sided, so the direction is reversed), in the primary position of the bulbs, nystagmus is not present. This nystagmus is practically always present even with lighter degrees of intoxication, but it belongs to the signs of intoxication with centrally acting drugs in general. It is a valuable objective symptom of an overdose of antiepileptics, neuroleptics, antidepressants. The pathophysiological basis is the dysfunction of the Purkinje cells of the flocculus, which cannot maintain the eccentric position of the bulb when viewed laterally.

Vertical downward beating nystagmus represents the so-called **"*down beat nystagmus* syndrome"**, locally specific for lesions of the lower stem. First of all, it is always necessary to exclude Arnold-Chiari malformation, but it is also accompanied by intoxication and vascular lesions.

Another type of central nystagmus is ***dissociated nystagmus***, in which each eye oscillates differently. The most common example of this type of nystagmus is the so-called **internuclear ophthalmoplegia** - when looking to the side, nystagmus appears on the abducting eye, the adducting eye does not retract and the nystagmus is not visible. The syndrome can be unilateral or bilateral. It typically occurs in patients with multiple sclerosis when the fibers of the fasciculus longitudinalis medialis are affected at the level of the pons. More rare is dissociated nystagmus, which has coarse, slow and irregular oscillations when viewed on one side, and fine, fast and regular oscillations when viewed on the other side - the so-called **Bruns-Stewart dissociation**. It sometimes occurs with cerebellar lesions, typically with cerebellar abscesses of otogenic origin as a complication of mastoiditis.

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