

MONOCULAR NYSTAGMUS

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It is pointed out by Kurz J. 1950 that monocular nystagmus is a rare pathologic phenomenon. K. F. Voitovich claims that till 1959 about 100 observations have been reported in the literature. We think that we should agree with the viewpoint of this author that monocular nystagmus is a phenomenon which has attracted less attention and is not so rare as it seems to be. Having in mind that this pathologic sign is not only of topical diagnostic importance but, as it is pointed out by B. Bratanov and G. Nastev (1960), its presence may characterize to a certain degree the morbid process. For that reason more attention should be directed to monocular nystagmus in everyday clinical practice.

Single reports exist in the literature, which only insufficiently discuss the problem. On the basis of foreign and three personal observations we shall attempt to present a more complete discussion of the problem.

Monocular nystagmus is a long known disorder. Jungen's description is dated back to 1864 (after Voitovich). In 1898 Neustätter speaks of unilateral nystagmus in amblyopia and amaurosis of one of the eyes. In 1903 Krauss, objecting the views of Neustätter on the origin of this type of nystagmus, presents a more profound explanation of some forms of this pathologic phenomenon with derangement of the associative ligaments for the movement of both eyes. So starts the study of this problem.

Today monocular nystagmus is known in the literature under the term "dissociated nystagmus" (Barré, Zimmermann).

Phenomenologically this disorder is presented by Blagoveshtenskaya N. S. (1962) in two varieties. In the first, one of the eyes displays a stronger nystagmus and the other — a milder one. In this case one speaks of elements of the monocular nystagmus. In the second variety, nystagmus is observed only in one eye, while the other remains mobile. This is the real monocular nystagmus. Proceeding from our second observation we must add that these two varieties may be encountered simultaneously in one and the same patient. In our patient gazing to the right resulted in a stronger nystagmus in the right eye, and a milder in the left (elements of monocular nystagmus), whereas gazing upward — nystagmus is observed only in the right eye (monocular nystagmus). This gives us grounds to admit the existence of mixed forms in one and the same patient.

I. Kurz mentions that monocular nystagmus may exist in a latent form, which is manifested only when the leading eye is closed. This method for inducing nystagmus we use not only to discover its latent form, but also to intensify the slightly manifested monocular nystagmus.

We admit that this way of examination should be introduced in clinical practice as a test for the detection of latent monocular nystagmus and for the sensibilization of a recorded, but milder nystagmus.

K. F. Voytovich describes the form of the alternating monocular nystagmus. This form is encountered in bilateral disorder of the oculomotor and abducens nerves.

When insufficiency of *m. rectus internus* of the eyes is present, horizontal nystagmus for the right ocular bulb at gazing to the left and for the left — at gazing to the right may be observed.

According to the direction of the rapid component monocular nystagmus is subdivided into horizontal, vertical, diagonal rotatory or completely irregular, named by I. Kurz (1903) as an aberrant form.

The oscillations of the nystagmus are usually quite rapid: I. Kurz (1903) records that they may amount to 80—400 oscillations per minute.

Often changes are observed in the speed of oscillations as well as in the size of amplitudes which to a large extent depends upon the position of the eye.

As far as the origin of monocular nystagmus is concerned, we admit that sufficient data exist to specify four types of monocular nystagmus.

1. Monocular nystagmus in amblyopia or amaurosis of one of the eyes. Neustätter also mentions this type of nystagmus. He reports 4 personal observations of unilateral amaurosis in which nystagmus occurred periodically — in one or the other eye alternately. The author explains this type of nystagmus with impairment of the visual centers and the visual conductors. He assumes that visual impulses are a necessary requirement for the conduction of motor impulses by way of the median line. The explanation, presented by Neustätter for this type of nystagmus meets certain objections, namely that monocular nystagmus in unilateral amblyopia is accompanied by this type of nystagmus. (I. Kurz). From these data a conclusion may be drawn that the disturbances of vision in one of the eyes are not of substantial importance for the origin of this type of monocular nystagmus. It is possible that other causes also exist.

This view is substantiated by one of our personal observations, in which right eye monocular nystagmus is recorded in amblyopia and insufficiency in the functions of the trigeminal nerve of the left eye.

Observation 1. R.K.R., female aged 60 years. Admitted to the Neurological Department of the District Hospital in Varna on November 14th, 1963, case record No 11618/63.

Case history: Admitted because of pains in the lumbar region and the dorso-lateral surface of the right leg and impaired vision of the left eye.

Neurological status: In gazing straight forward the left eye ball is turned up and outwards. In turning the left eye ball down and outwards a restraint is observed. In gazing to the right a slight horizontal nystagmus of the right eye is seen, which intensifies when the left eye is closed. The visual acuity of the left eye equals 0.09.

An ishialgic syndrome is also established.

This observation indicates that in addition to amblyopia an impairment of the function of the trochlear nerve is present. It is difficult to establish which one of these two factors plays a decisive role.

2. Monocular nystagmus in disturbances of the oculomotor nerve (nn. oculomotorius III, abducens VI and trochlear IV).

Monocular nystagmus may be observed in paresis or paralysis of some of the oculomotor nerves (n. oculomotorius III or abducens VI). One of our observations represents this very type of monocular nystagmus:

Observation 2. Y.I.T., female aged 55 years. Admitted to the Neurological department of the District Hospital in Varna on October 21, 1963, case record No 1080/63.

Case history: She was admitted on account of waddling gait and visual impairment. The disorder started two years ago. In September 1961 the upper eyelid of her left eye slightly fell, vertigo and headache occurred, walking became unstable — a waddling gait appeared, particularly in darkness and with closed eyes. Occasionally diplopia occurred.

Neurological examination — mild ptosis of the left eyelid and a slight exophthalmus of the left eye ball. An upward, nasal and downward restraint in the mobility of the left eye ball is observed. Mydriasis of the left pupil. Both pupils do not react to light; there is a mild reaction to accommodation and convergence (Syndrome of Argyll-Robertson). In gazing upwards monocular vertical nystagmus is observed of the right eye. In gazing to the right marked horizontal nystagmus with unequal oscillations is observed in the right eye and mild in the left eye. When the left eye is closed, nystagmus of the right eye intensifies. Hearing is diminished with the left ear. Walking is atactic. Ataxy increases with shutting the eyes (Syndrome of Romberg).

Examinations: the ocular fundi — atherosclerosis of the retina; Cerebrospinal fluid — no pathological findings. Wasserman's test in the blood and the cerebrospinal fluid — negative.

Diagnosis — Cerebrospinal lues.

In this patient monocular vertical nystagmus was present together with elements of horizontal monocular nystagmus of the right eye and an injury of the left oculomotoric nerve. Syphilis being the fundamental pathological process in this patient, it may be assumed that nystagmus is of another origin identical with that of the waddling gait of the patient. To this an objection may arise that waddling is identical on both sides and that if the origin of the nystagmus was the same, it might be expected nystagmus to be bilateral and not unilateral. Therefore, it should be admitted that nystagmus is evidently associated with the paresis of the left oculomotoric nerve. This is supported by the fact that nystagmus changes its direction depending on the direction of the changes in gazing: in gazing outwards — horizontal, and upwards — vertical (Triumphov).

An impression is created that the center which coordinates the convergence of the visual axes upwards and outwards is impaired by the paresis of the oculomotoric nerve of the left eye, and not being able to realize the final deviation of the paralyzed eye, periodically turns back the sound eye to the position of the paretic one. This turning is more clearly evident in the large and unequal oscillations in horizontal deviation of the eyes as compared with the small vertical nystagmus when gazing upwards. B. Bratanov and G. Nastev give a detailed explanation of the monocular nystagmus in an analogous case.

In the same way the origin may be explained of monocular nystagmus when n. abducens (VI) is injured.

Monocular nystagmus as a result of injury of the third oculomotoric nerve — N. trochlearis (IV) is also of great interest. It should be pointed out that in the literature similar observations are not encountered. Our first observation, in which an injury was established in the function of

the left trochlear nerve, showed that such cases are also possible. We will not discuss the origin of monocular nystagmus, solely related to injury of the trochlear nerve, as the same eye suffered from marked amblyopia.

3. Monocular nystagmus in injury of the posterior longitudinal fascicle (fasciculus longitudinalis posterior).

As it is well known, the posterior longitudinal fascicle connects the nuclei of the oculomotoric nerves with those of the vestibular ones. The unilateral injury of this fascicle in the absence of paresis and paralysis of some of the oculomotoric nerves induces monocular nystagmus. A number of experiments witness the existence of such a form of monocular nystagmus.

Serres and later Graefe and Beaunis, induced monocular nystagmus on the contralateral side by irritating parts of corpora quadrigemina. Probst dissecting along the median line the midbrain in cats, half an hour following the operation observed in addition convulsions and twisting of the animal to the left, also unilateral nystagmus of the left eye, which continued for 4 hours. Also Mangold and Löwenstein dissecting pes pedunculi have induced nystagmus of the contralateral eye. B. N. Klovovski, by means of intersection of the posterior longitudinal fascicle, observes monocular nystagmus in the contralateral eye.

Besides experimental, there exist also clinical observations which give grounds to assume that monocular nystagmus originates from the injured posterior longitudinal fascicle when data for injuring of the oculomotoric nerves and other formations of the brain stem are lacking. Such is also the idea in Bratanov and Nastev's paper. We also observed a patient with multiple sclerosis whose monocular nystagmus is due to injury of the posterior longitudinal fascicle. The following is the observation itself:

Observation No. 3. P.K.Ch., male aged 45 years, admitted to the Neurological department of the District Hospital in Varna on October 10th, 1963, discharged on October 29th, 1963. Case record No 10510/1963.

Anamnesis: Admitted on account of motor incapacity of the lower extremities and unstable gait. The disorder started January 1951. After continuous work in the cold he felt lassitude, headache and pains in the lumbar region and the right leg. These complaints continued for several days, and then gradually subsided. During the following month the patient had occasional pains in the lumbar region and in the leg. In 1952 weakness of the right leg occurred. Walking was impaired — he often stumbled and sometimes even fell. In December 1953 clonic convulsions in the muscles of the extremities and the body appeared, his speech became unintelligible, the strength of the right hand also decreased. In July 1954, on account of weakness of his right leg, he fell from a height and remained unconscious for about 19 hours. His condition did not change substantially. Later diplopia occurred which continued for 1—2 years. Afterwards it subsided and did not recur.

In 1961 a pneumoencephalogram was made. No pathological findings were detected.

From the neurological status — In examining the mobility of the eye balls a nonsymmetrical nystagmus is established with a tendency towards a monocular nystagmus. In gazing to the right, the right eye displays big horizontal continuous nystagmus with a rotatory component and in the left eye a small quickly subsiding one. Central type injury was present of the right facial nerve. Hearing is impaired with the left ear. A right spastic hemiparesis and hemihypesthesia are found. Abdominal reflexes are bilaterally absent. Bilateral ataxy of the extremities is present, more marked to the right side.

From the examinations: ocular fundt, blood picture and urinalysis — with no pathological findings.

Diagnosis: Multiple Sclerosis.

Thus the symptoms of the brain stem, namely transient diplopia, impairment of the left acustic nerve and the atactic signs give us grounds to assume that the monocular nystagmus is of brain stem origin in this case. The absence of diplopia now (which was established by means of the double images test) enable us to exclude an origin peripheral to the oculomotoric ones and to admit that it is due to an injury of the posterior longitudinal fascicle. It should be added for completeness that Engelking, Priestley, etc. (after Voykovich) attempt to explain this type of nystagmus with the hypothesis that subcortical secondary centers exist for each eye separately. Therefore each eye may receive independent impulses from the corresponding eye and to react alone.

4. Monocular nystagmus of cortical origin. This origin is admitted for monocular nystagmus by Engelking. We also assume that such a possibility should not be excluded. It may even be admitted that the origin of monocular nystagmus in our third observation is primarily due to the injury of the posterior longitudinal fascicle and in the second place — unless it is not secondary to a cortical injury, it may be due to a lesion in the connection of the cortex with the nuclei of the oculomotoric nerves and the posterior longitudinal fascicle. This conclusion is based on the finding of unilateral lesion in the pyramidal tract. Certainly this possibility should be ascertained.

In general, as Voytovich points out, conclusions being made on the basic assumption that nystagmus represents a reflectory phenomenon, it should be admitted that its occurrence is directed not only by visual perceptions but also by such of the proprioceptive impulses of the ocular muscles. In pathologic conditions various points of the complex reflectory arch may be affected: the afferent, the efferent or the contact. According to Voytovich, monocular nystagmus occurs in the presence of binocular nystagmus and the impairment of the functions of the paralyzed muscle of the other eye. This thesis is supported by the fact that after recovery of the function of the paralyzed muscle monocular nystagmus turns into a binocular one.

Although this hypothesis explains some of the forms of monocular nystagmus, we should admit the existence of the foregoing four separate forms of this pathologic phenomenon.

Attention should also be paid to the question raised by Bratanov and Nastev concerning the significance of monocular nystagmus not only for the tonic detection of the lesion, but also as regards the character of the pathologic process. Their observation is considered as an encephalic focus developed in the course of infectious lymphomononucleosis. Our second observation represents also an inflammatory process — multiple sclerosis with a possible focus in the brain stem. But even in our first case, although an injury of the oculomotoric nerve exists, the basic process remains inflammation. Voytovich reports also that of his 14 observations of monocular nystagmus, 7 were suffering from multiple sclerosis, 5 — from cerebral vascular disorders, and 2 — from

traumatic subarachnoidal hemorrhage. Barré, J. A. points out that this type of nystagmus is most commonly encountered in multiple sclerosis. All this does not give us grounds to assert that monocular nystagmus is only met within inflammatory processes. We nevertheless assume that inflammation itself more often may lead to the occurrence of monocular nystagmus.

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ОДНОГЛАЗЫЙ НИСТАГМ

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РЕЗЮМЕ

Основываясь на собственных и чужих наблюдениях, авторы пытаются целостно рассмотреть современное состояние вопроса о монокулярном нистагме. Излагая феноменологию этого патологического проявления, авторы на собственном наблюдении показывают возможность встречи смешанных форм из элементов монокулярного нистагма и самого одноглазого нистагма и делают предложение использовать пробу для сенсбилизации монокулярного нистагма. Основываясь на патогенезе проявления, они обособляют четыре типа монокулярного нистагма, сообщая и одну форму этого симптома при вероятном поражении блокового нерва.