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Electronystagmographic Study in Chronic Schizophrenia

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Abstract: The authors reached the neurological and psychiatric diagnosis of chronic schizophrenia in 20 patients after examination of both vestibulooculomotor and visuooculomotor reflexes on electronystagmography. The type and intensity of the disease were established on adequate scales, and the entire group was tested in the remission stage, during the absence of psychotic signs. Electronystagmographic study, particularly the eye-tracking test with caloric modification, revealed the significant pathology of optokinetic nystagmus. The disturbances of the suppression effect of fixation on caloric nystagmus were observed in one-half the cases. Caloric stimulation demonstrated no case of canal paresis and a very small amount of directional preponderance.

Key Words: electronystagmography; schizophrenia; schizophrenic defect; vestibular findings; vestibular reactions; vestibulooculomotor reaction; visuooculomotor reaction

Electronystagmographic (ENG) study in chronic schizophrenia is helpful during the localization process and estimation of the intensity of "schizophrenic defect." Matsue and Okuma [1] and Oepen et al. [2] suggested that the dysfunction of the right hemisphere, especially its parietal lobe, is responsible for manifestation of this disease. Disturbances of visuooculomotor reactions, which are closely connected with perception, were reported by many investigators who highlighted the cortical-subcortical origin of the pathological signs of schizophrenia. The predicting and classifying role of vestibular findings in the diagnostic process of reactive and organic schizophrenia was postulated by Holzman et al. [3] on observation of twins and by Huddleston [4] working on vestibulospinal reflexes. The aims of our study were to estimate the usefulness of ENG study in diagnostic procedures of chronic schizophrenia and to verify the hypothesis of the correlation between schizophrenic defect and pathological visuooculomotor reactions.

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MATERIALS AND METHODS

We tested a total of 20 patients (12 men, 8 women), aged 22 to 50 (average, 34.3 years), who suffered from chronic schizophrenia, recognized according to the *Diagnostic and Statistical Manual of Mental Disorders*, third edition, revised (DSM-IIIR) system. The psychiatric examination allowed us to classify them as grade 3 according to the Clinical Global Impression Scale; to level 82–98 points according to the Positive and Negative Syndrome Scale; and to a 56- to 68-point level according to the Global Assessment of Functioning Scale (DSM-IIIR Axis V).

The patients in our selected group demonstrated a similar clinical history. They were tested during remission, when no psychotic signs were present, and after a 12-hour period free from medical treatment.

During ENG, we analyzed various nystagmus types: spontaneous, gaze, optokinetic, and postcaloric (in Bruning's proof, using Jongkees' formula for evaluation of unilateral weakness and directional preponderance). We also assessed the results of the eye-tracking test with caloric modification. The fixation index (after Demanez [5]) was calculated, regarding as normal the scores from 51.4% to 88.4%, according to that author's suggestion.

Table 1. Results of ENG Examination in Schizophrenic Patients and Control Group

ENG Pathology	No. of Schizophrenic Patients	No. of Controls
Calibration	4	0
Spontaneous nystagmus with eyes closed	9	0
Spontaneous nystagmus with eyes open	9	0
Gaze nystagmus	3	0
Type of eye-tracking test		
II	10	3
III	2	0
IV	3	0
Caloric eye-tracking test		
II	10	3
III	4	0
IV	2	0
Optokinetic nystagmus	13	2
Unilateral weakness	4	0
Directional preponderance	1	1
Demanez index	10	2

ENG = electronystagmography.

RESULTS

The pathological ENG findings are listed in Table 1. Qualitative estimation of ENG recordings revealed the presence of dysrhythmic nystagmus in five patients. In four cases, very small values of amplitude and frequency and of slow-phase velocity in postcaloric nystagmus were observed, so an additional 20°C stimulation was ordered to confirm vestibular hypoexcitability and to receive positive answers.

DISCUSSION

The coexistence of pathological results of the eye-tracking test with caloric modification and optokinetic reaction in our patients suffering from chronic schizophrenia confirmed the previous observations made by a number of researchers [6–10] suggesting disability of the structures situated above the brainstem. Conversely, Levy et al. [11] could not find any vestibular disturbances in their schizophrenic cases, and other investigators underscored the lack of specificity of ENG study because of similar results obtained in manic-depressive psychosis and depressive syndrome [10, 11].

The great diagnostic value of the eye-tracking test in evaluating schizophrenic defect was postulated by Acker and Toone [12]. In our material, disorders of this test, classified as type II after Maspetiol [13], were the most frequent and were typical for chronic schizophrenia, according to the suggestion by Oepen et al. [2]. Visuovestibular integration was easily observed during caloric modification of the eye-tracking test and was revealed as being disturbed in the majority of our patients, as has been reported by others [6, 12]. In accord with Matsue and Okuma [1] and Oepen et al. [2], our search for unilateral dysrhythmia of smooth-pursuit eye movements specific for pathology of the right hemisphere failed in our subjects but documented the usefulness of the eye-tracking test in monitoring schizophrenic progress if we followed the hypothesis of a "subclinical marker" established in that test by Holzman et al. [3]. (Holzman showed that the eye-tracking test is disordered in a high percentage of monozygotic twin pairs and, even more interesting, in dizygotic twin pairs, even in one case in which a single twin demonstrated symptoms of schizophrenia but the second twin of the pair was free of clinical signs of mental disease [subclinical phase].)

The Demanez index [5], which appears to be important in the diagnosis of acute schizophrenia, was normal in one-half of our subjects, which might be attributable to the disease phase during which we tested our subjects or on the difficulties in interpreting postcaloric hyporeactions [8, 10, 11]. Such small reactions (hypoactivities) were demonstrated previously by Fish and Dixon [14] in the patients' mothers, confirming the genetic suggestion of schizophrenia.

As regards vestibular estimation, certain evidence of schizophrenia was not found, but some special configuration of the pathological signs might suggest the diagnosis and directed the subsequent investigations.

SUMMARY

The vestibular disorders in chronic schizophrenia were frequently observed in our subjects. The central defect was suspected on the basis of the pathology of the eye-tracking test and of optokinetic responses. In searching for the localization of the schizophrenic defect, vestibular findings pointed to the disabilities of the structures situated above the brainstem. An abnormal eye-tracking test with caloric modification suggested visuovestibular disintegration. The diagnostic value of the suppression test (carried out according to Demanez [5]) was absent in the remission phase of the disease.

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