THE INCIDENCE OF VISUAL SUBCLINICAL MANIFESTATIONS IN MULTIPLE SCLEROSIS

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ABSTRACT

Optic neuritis is often the initial manifestation in multiple sclerosis (15%). There is a significant percent of patients affected by clinically definite multiple sclerosis that report no ocular symptoms. Some of this patients complain of poor vision despite the 6/6 visual acuity with Snellen test. Subclinical visual abnormalities may be revealed by more sensitive measures of visual function. Alteration of visual evoked potential latencies associated with brain MRI lesion burden, standard achromatic perimetry and low-contrast letter acuity, may detect subclinical visual manifestations. In this study we compare the efficiency of electrophysiological test (visual evoked potential) and subjective tests (contrast sensitivity and standard achromatic perimetry) in detection of visual impairment in a population of asymptomatic patients with clinically definite multiple sclerosis.

Purpose. The detecting of subclinical impairment of visual function in a population of visual asymptomatic patients affected by clinically definite multiple sclerosis (MS) by using visual evoked potentials (VEPs), contrast sensitivity (CS), standard achromatic perimetry (SAP), magnetic resonance imaging (MRI), color vision test Ishihara, best corrected visual acuity (BCVA).

Methods. Eighteen eyes of nine patients affected by clinically definite MS, without visual disturbances and optic neuritis history. All the patients were recruited at the Department of Neurology of Emergency Universitary Hospital of Bucharest. Of the nine patients, 3 were male and 6 female. In all the cases the disease was in remission.

The tests used to detect the involvement of visual pathway were:

- VEPs (a P100 latency >115 ms)
- CS
- SAP (abnormal MD or PD)
- MRI (at least one demyelinating plaque along visual pathway)
- Color test Ishihara
- Best corrected visual acuity (BCVA)
- Biomicroscopy
- Ocular fundus examination after pupil dilatation

Results. From the 9 patients in the 29-47 year age group, VEPs was abnormal in 8 cases (88,8%), CS was abnormal in 8 cases (88,8%), SAP in 44,4%, color vision test Ishihara evidenced colour desaturation at 100% cases. Best corrected visual acuity, biomicroscopy and ocular fundus examination were normal in 55,5% cases.

Conclusions. In patients affected by MS with no history of optic neuritis and no visual symptoms, there is large prevalence of visual pathway involvement that can be detected by performing multiple tests. Only a combination of CS, VEPs and SAP can detect most cases of visual dysfunction associated with MS.

Key words: multiple sclerosis (MS), visual evoked potential (VEP), contrast sensitivity (CS), standard achromatic perimetry (SAP)

A substantial proportion of patients with multiple sclerosis appear to have no visual involvement when they are examined by conventional clinical tests (visual acuity, biomicroscopy or ocular fundus). They may complain of imperfect vision despite 6/6 visual acuity on the Snellen test. (1). In other cases, no ocular symptoms are reported, but specific examinations can reveal subclinical abnormalities (2, 3). Alterations of visual evoked potential (VEP) latencies during pattern stimulation is considered one of the most characteristic electrophysiological signs in patients with MS in a percentage that varies from 35% to 93%. (2,5,6) Subjective tests such as CS (contrast sensitivity), standard achromatic perimetry (SAP), color test and best corrected visual acuity (BCVA) have been reported to be useful.

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MATERIAL AND METHODS

Starting with March, 2012, 9 patients diagnosed with definite MS, with no visual symptoms, without previous optic neuritis were enrolled in the study. They were selected at the Department of Neurology of the Emergency Universitary Hospital of Bucharest. Of the 9 patients, 3 were male and 6 female, all with MS in remission. The patients underwent full ophthalmic examination.

Best corrected visual acuity (**BCVA**) measurement. The Snellen visual acuity equivalent was determined by the lowest line read on the 100% chart.

Biomicroscopy was performed by a Zeiss biomicroscop.

Ocular fundus examination after pupil dilatation

The latency of **VEPs** >115 ms was considered abnormal.

Contrast sensitivity (**CS**) was performed with Low Contrast Sloan Letters Charts.

Patients were tested with both eyes first, then right and left eye individually, first at 100% efficiency, then at 2,5% and 1,25% efficiency.

MRI of orbits, brain and spinal cord was performed in all patients.

Standard achromatic perimetry (SAP) was performed with Octopol PTS 910. There were performed two consecutive visual field examinations. Only the second visual field was considered for the study and the mean deviation (MD) and pattern standard deviation (PSD) interpreted as abnormal by the instrument software were included as abnormality criteria. The used strategy was fast threshold (on 30 degrees).

Color vision was tested with Ishihara plates.

Results

BCVA was 20/20 (Snellen acuity) in all cases.

Biomicroscopic exam was normal at all patients.

Ocular fundus was normal in all cases.

Latency of **VEPs >115 ms** was detected at 8 patients. (88,8%)

MRI indicated no involvement of visual pathway in 4 patients (44,5%) and 10 eyes (5 patients) (55,5%) with visual pathway localization of demyelinating plaque.

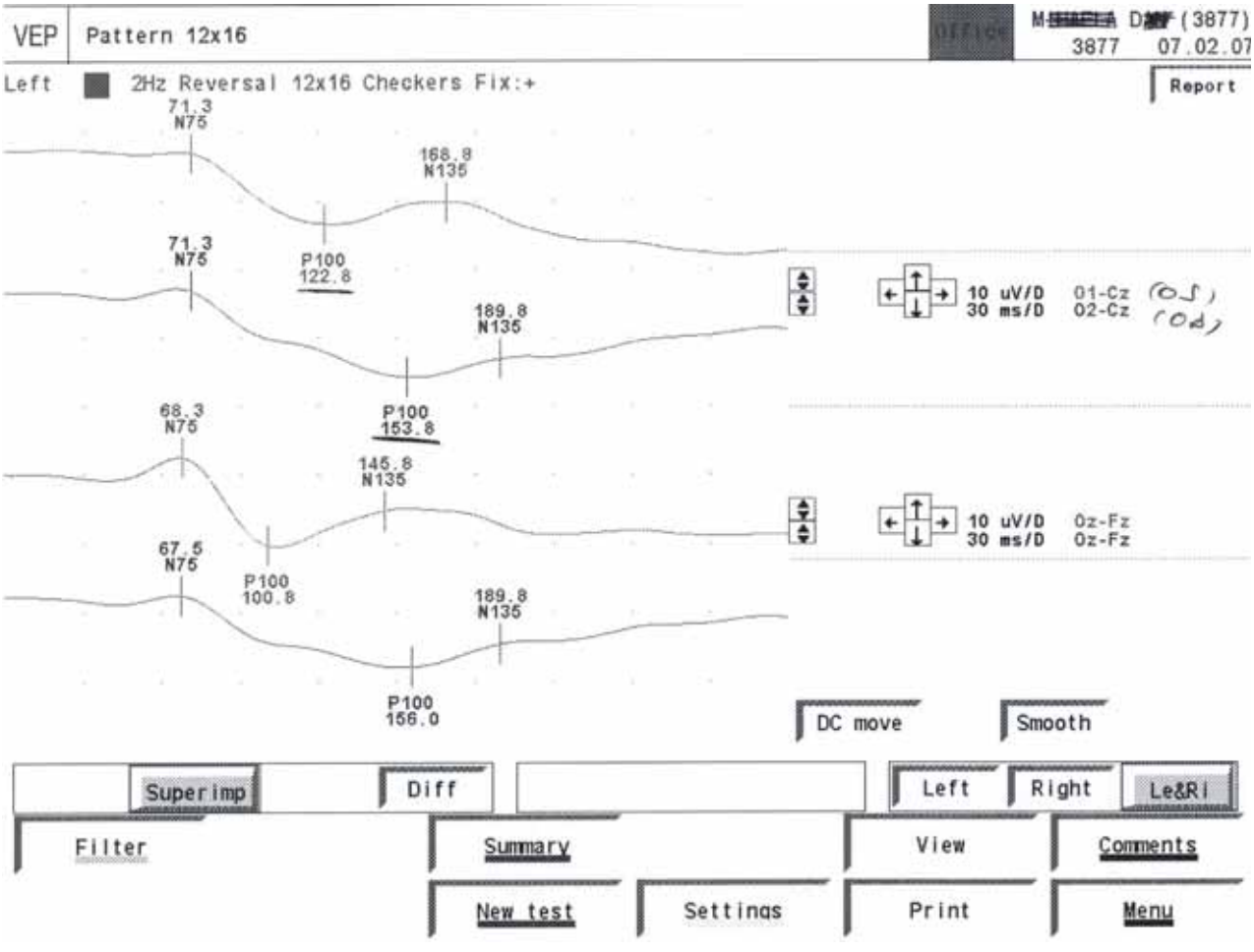

FIGURE 1. *VEPs latencies during pattern stimulation >115 ms*

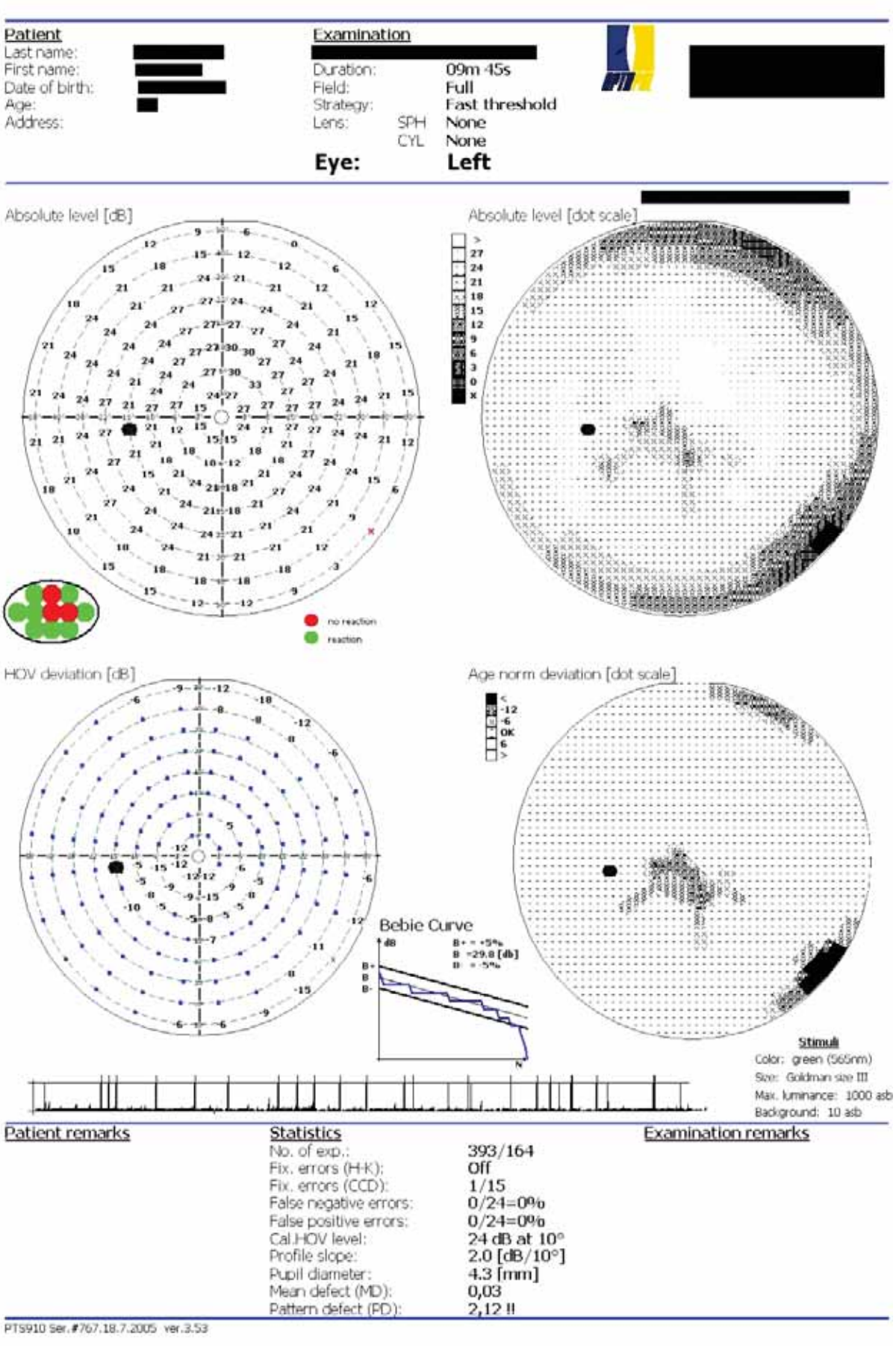

FIGURE 2. *SAP (standard achromatic perimetry), strategy fast threshold. Central scotoma on 5 degrees with Pattern defect (PD) 2,12*

SAP reveal visual field losses diffuse (large prevalence of MD alterations):

- 1 patient presented central depression on approximate 10 degrees (11,1%) and MD = -1,12 PD = 0,86
- 1 patient with central scotoma on 5 degrees (11,1%) and MD = -2,12 PD = 0,03
- 1 patient with partial left homonymous hemianopia (11,1%) and MD = - 0,94 PD = 1,52
- 1 patient with right cvadranopia (11,1%) and MD = -2,15 PD = 1,19
- 5 patients had no alterated visual field (55,5%) but had abnormalities of MD (mean deviation) and PD (pattern deviation) (Figure 2)

CS (contrast sensitivity) was impaired in 8 patients, only one was normal.

3 patients with Snellen visual acuity equivalent (SVAE) 6/9,6 for lowest line on 2,5% Sloan Chart (33,3%)

3 patients with SVAE 6/6 for lowest line on 2,5% Sloan Chart (33,3%)

2 patients with SVAE 6/60 for lowest line on 1,5% Sloan Chart (22,2%)

1 patient had SVAE 6/6 for the last line on 1,5% Sloan Chart (11,1%)

Color vision by test Ishihara evidenced colour desaturation at 5 patients. (55,5%)

DISCUSSION

Patients with multiple sclerosis (MS) often demonstrate visual dysfunction which may be clinical or subclinical. The detection of occult visual loss is important in establishing a diagnosis of multiple sclerosis, especially in patients who have neurological symptoms of the disease (3,4). In many patients with multiple sclerosis, usually ocular tests (visual acuity, biomicroscopy, ocular fundus, visual fields) may not detect functional visual deficit. In some MS patients visual acuity may be normal even when patients complain of poor vision described as "blurred" or "wash-out". (3,5)

Impairments in contrast sensitivity was obtained in 88,8% of patients with multiple sclerosis, all patients with normal Snellen acuity and no visual symptoms. (1,5).

Delayed visual evoked potentials (VEPs) were found in 88,8% cases. There is uncertainty as to the strength of the relationship between abnormalities in the VEPs and the visual impairment measured by test of contrast sensitivity (1). The VEP P100 latency is the most diffuse and the parameter most often used to detect optic nerve involvement, but is not very sensitive in the diagnosis of postchiasmal localizations.(2,9) Both contrast sensitivity and visual evoked potential were superior to ocular fundus and visual field examination in demonstrating minimal visual disturbance in patients with normal acuity. (1) Despite the fact that neither VEP nor CS could detect all the cases of MS, when the two tests were taken together, over 90%of patients had at least one abnormal test result. (3,4,5) Therefore, the combination of two tests can improve the detection of visual dysfunction in asymptomatic eyes.(4) Burki studied VEP and CS in 49 patients with optic neuritis and 26 multiple sclerosis patients with no previous history of optic neuritis and concluded that combined testing with CS and VEP was superior to a single test and detected 100% of optic nerve lesions (3,11).

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