Optic Neuritis as First Clinical Manifestations
the Multiple Sclerosis

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ABSTRACT

Aim: To analyze the clinical signs of multiple sclerosis (MS) and show that optic neuritis is one of the first event, which indicates the development of disease. Patients and methods: The study involved 89 cases in which it confirmed MS at the time of the March 2009–2011. Since ophthalmological parameters were analyzed: visual acuity (VA), visual field (VF), and retinal nerve fibre layer (RNFL) thickness of peripapillary rim by optic coherent tomography (OCT). Results: Ten (10) patients had ON as the first clinical manifestation of the disease which was statistically significant ($X^2=9.7 \ p=0.01$) compared to the manifestation of other clinical signs of disease. In VF, centrocecal scotomas were predominant in 50% of the subjects; the RNFL thinning of the neuroretinal rim was verified in all patients, most often in the upper quadrant. A month after pulse corticosteroid therapy, visual acuity in all patients with ON ranged from 0.6 to 1.0. Conclusion: ON is one of the first MS clinical manifestation.

Key words: multiple sclerosis (MS), optic neuritis (ON), visual acuity (VA), visual field (VF), retinal nerve fibre layer (RNFL) thickness.

1. INTRODUCTION

Optic neuritis related to MS is an acute optic neuropathy occurring in young people, especially in women. The clinical picture shows a decline in visual acuity, a pain which increases with movements of the eye, a decline in contrast sensitivity, dyschromatopsia and changes in the visual field (1). It occurs more often unilaterally in young people, predominantly in women with an incidence of 1-5 per 100,000 annually (2). The main aim of this study was to determine the onset of optic neuritis as the first MS clinical presentation. We also wanted to analyze the role and significance of morphometric changes in the optic nerve and visual field by analyzing parameters of Optic Coherent Tomography (OCT) and computer perimetry in these patients. One of the aims was to determine the efficiency of pulse corticosteroid therapy in those patients.

2. PATIENTS AND METHODS

A clinical, retrospective study was conducted at the Eye Clinic and the Neurological Clinic, Sarajevo University Clinical Centre (SUCC) at the time of the March 2009–2011. After the first clinical signs follower is a detailed examination of patients by neurologists and ophthalmologists. Here we did not analyzed cases of MS relapses. In all analyzed patients we found a unilateral optic neuritis.

We approached MS verification according to Paty or Brakhof modern clinically defined multiple sclerosis (CDMS) criteria (3, 4).

- First criterion: at least two separate clinical episodes of the disease that occurred at different times and at least two fields of demyelination. Of radiological tests, MRI of the brain and spinal cord were analyzed.
- Second criterion: two MS clinical episodes, one MRI manifest lesion and paraclinical symptoms.
- Laboratory-supported MS diagnosis:
  - Two episodes, one clinically and paraclinically confirmed lesion and immunoglobulin abnormalities of cerebrospinal fluid.
  - One episode, two clinically separate lesions and cerebrospinal abnormalities.

Of neurological parameters we analyzed clinical manifestations of motor, sensory and sensitive disturbances, relevant to the confirmation of MS diagnosis. Of ophthalmological parameters, we analyzed: visual acuity (VA) by Snellen charts, visual field (VF) by Octopus 100, and thickness of the peripapillary rim nerve fibres by Stratus Zeiss Optic Coherent Tomography (OCT).

3. RESULTS

In the study included 89 cases with confirmed MS diagnosis. Ten (10) patients had optic neuritis as the first sign of the disease.

| Structure of patient age | 18-30 | 31-50 | Total patients |
|--------------------------|-------|-------|----------------|
| n                        | %     | n     | %             | n     |
| 9                        | 90    | 1     | 10            | 10    |

$X^2=6.4 \ p=0.01$

Table 1. Age structure of MS patients with verified optic neuritis
the upper quadrant. of the nerve fibres in the whole circumference, most often in
ness of papillary and parapapillary layers (of the neuroretinal
in 50% of the cases.
we find most frequent disturbances in the centrocecal region
days, after 1, 3, 6 and 12 months.
tation of MS, compared to the other motor, sensory and sensory
confirmed that the optic neuritis is one of the first clinical manifes-
in the female patients (70%) compared to the male patients.
Table 2. Gender structure of MS patients with verified optic neuritis
The age structure analysis of the sample shows that optic neu-
ritis was most often present in the patients aged 18 to 30 years.
In the entire sample, onset of optic neuritis was more frequent
in the female patients (70%) compared to the male patients.
Clinical manifestations Number
Paresthesia 8.99 8
Monoparesis 5.62 5
Diplopia 2.25 2
Hemiparesis 7.87 7
Blurred vision 11.24 10
Impaired hearing 7.87 7
 Burning and tingling 5.62 5
Ataxia (unsteadiness) 6.74 6
Lemnitis sign 2.25 2
Iredness, fatigue quickly 7.87 7
Eating urinating 6.74 6
Speech difficulties 4.49 4
Nystagmus 4.49 4
Insomnia 6.74 6
The crisis of conscious 4.49 4
Dysarthria 6.74 6
In total 100.00 89
Χ²=9.7  p=0.01
Table 3. The first clinical manifestation of MS in our sample
Statistically significant tests (Χ²=9.7 p=0.01) we have con-
firmed that the optic neuritis is one of the first clinical manifes-
tation of MS, compared to the other motor, sensory and sensory
events in our sample.
Ophthalmological parameters we followed after 7 and 15
days, after 1, 3, 6 and 12 months.
Analyzing disturbances in the computerised visual field: cent-
rocecal and paracentral scotoma and diffuse sensitivity, we find
most frequent disturbances in the centrocecal region
in 50% of the cases.
Scotomas of visual field Centrocecal Scotoma Paracentral Scotoma Diffuse depression of sensitivity Total patients n % n % n % n %
5 50 2 20 3 30 10 100
Table 4. Different kinds of scotoma in visual field in MS patients with optic neuritis
By analysis of OCT results in part of the nerve fibre thick-
ness of papillary and parapapillary layers (of the neuroretinal
rim), we had, after three months, results showing the thinning
of the nerve fibres in the whole circumference, most often in
the upper quadrant.
RNFL Average Superior Inferior Temporal Nasal (microm) +/- SD 104 +/- 9.7 103 +/- 8.4 105 +/- 7.6 102 +/- 12.2
No. of subjects 4 3 1 2
Table 5. Retinal Nerve Fibre layer (RNFL) by optic disc
Visual acuity in all patients with optic neuritis at the first
examination ranged from 0.1 to 0.3 with correction. After the
administration of pulse corticosteroid therapy, all patients with
optic neuritis had a significant improvement of VA, and a month
upon administration it varied from 0.6 to 1.0.
4. DISCUSSION
In our sample of 89 patients with the verified MS diagnosis,
10 patients had a clinical picture of optic neuritis, as a first clini-
cal sing of disease, it was statistically significant (Χ²=9.7 p=0.01).
The Optic Neuritis Study Group describes the changes of visual
functions in MS patients, which usually present as a decline
in vision, blurring, decline in contrast sensitivity, color vision
disturbances, as well as disturbances in the visual field (1-5). In
their studies, Allnare Y. and Deretzi G.confirm the genetic
impact on MS development as an autoimmune disease in some
families (6). Studies were performed to analyze the influence of
stress, viral and bacterial infections of respiratory tract, urinary
and gastrointestinal systems on the appearance and occurrence
of MS exacerbations (7, 8). In our study, the disease appeared
most often in the patients aged 18-30 years. Specified frequency
was statistically significant (Χ²=6.4 p=0.01). Women made up
70% of the group. Noonan CW and Kathman SJ in their study,
which includes the U.S. population get results which show that
the ratio of the incidence of occurrence of MS ranged from
1.9: 1 to 3.6:1 in favor of women (9). A large number of studies
confirm the MS and ON occurrence at a younger age and more
often in women (1, 2, 5, 10).
Balashov KE. finds a higher ON incidence in the spring
months in the patients without verified demyelising lesions,
which has been observed in our past practice too, and which
could be an aim of our future studies (11). Cigarette smoking
is also a risk factor in the development of MS and ON (12).
In 50% of our subjects we had centrocecal scotoma in the
visual field, and sensitivity depression in 30%. Disturbances in
the central areas of the visual field were verified in other stud-
ies as well (1, 13).
Visual acuity in all patients with optic neuritis at the first
examination ranged from 0.1 to 0.3 with correction. All pa-
tients with an ON and verified MS diagnosis monitored in this
study were treated with pulse corticosteroid therapy in a dosage
of 1,000mg for three days, followed by 8 days of 1mg/kg b.w.
dosage. A month after pulse corticosteroid therapy, visual acuity
in all patients with ON ranged from 0.6 to 1.0.
Corticosteroids administered intravenously by the pulse
therapy scheme prevent ON relapse, but they have the same
effect on definite VA as corticosteroids orally administered.
ONTT finds that the ON patients treated with prednisolone
orally administered in a dosage of 1mg/kg b.w. for 14 days have
more frequent recurrent ON compared to those treated with
pulse therapy. ONTT shows that intravenously administered
corticosteroids inhibit MS development for a 2-year period, but

| Gender of patients | Male | Female | Total patients |
|--------------------|------|--------|----------------|
| n %                | n % | n %    | n %           |
| 3 30 7 70 10 100   |     |        |               |
Χ²=1.6  p=0.02
Table 2. Gender structure of MS patients with verified optic neuritis

| Visual acuity on first examination n % | 0.1-0.3 | 0.4-0.5 | 0.6-1.0 |
|---------------------------------------|---------|---------|---------|
| Visual acuity after corticosteroid therapy n % | 0.1-0.3 | 0.4-0.5 | 0.6-1.0 |

Table 6. Visual acuity on first examination and one month after corticosteroid therapy
after three years that effect disappears (14, 15).

Three months after the first ON presentations, the OCT analysis of retinal nerve fibre thickness and neuroretinal rim confirmed the nerve fibre thinning in all subjects. The most frequent thinning occurred in the upper quadrant.

ONTT shows that 50% of the patients with ON develop MS over a 15-year period. ONTT also finds that in ON patients without MRI changes, MS develops in 25% of the cases, and in the cases with one or more CNS lesions that is 75%. All patients had OCT-verified nerve fibre atrophy after ON (1, 14). According to other researchers, by OCT analysis it can discover in vivo atrophy of nerve fibres in patients with MS as structural damages of axons of afferent fibres of the visual pathway (15, 16).

Studies show, by morphometric analysis of the structure of nerve fibres by OCT, that there is fibre atrophy in the MS patients with and without ON. However, retinal nerve fibre atrophy is more significant in the patients with ON (16).

5. CONCLUSION

In our sample with the predominantly female gender ranging from 18 to 30 years of age, ON occurred as the first clinical presentation of MS. The analysis of the computerised visual field confirmed centrocecal disturbances as the most common, and optic coherent tomography registered the thinning of the nerve fibres of the neuroretinal rim in all subjects. A month after pulse corticosteroid therapy, VA was significantly improved in all patients.

CONFLICT OF INTEREST: NONE DECLARED.

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