Optic coherence tomography in a patient with diffuse unilateral subacute neuroretinitis

Tomografia de coerência óptica em neuretinite subaguda difusa unilateral

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ABSTRACT

Purpose: To measure retinal nervous fiber layer (RNFL) thickness using OCT3 (Carl-Zeiss) in patients with diffuse unilateral subacute neuroretinitis (DUSN) with or without live worm and correlate it with visual acuity. Methods: RNFL thickness, using RNFL thickness 3.4 program and best corrected visual acuity were measured in patients with DUSN between January 2005 and December 2006. Results: Thirty-eight patients, aged 9 - 42 years were selected, of whom 20 had live worm. Mean RNFL was 71.55 ± 27.26 in the DUSN eye and 103.07 ± 20.66 in the contralateral eye (p<0.001). Pearson’s correlation between visual acuity and RNFL was r = -0.522 (p<0.001) in the DUSN eye and r = -0.097 (p=0.509) in the contralateral eye. Conclusion: RNFL thickness in DUSN patients is directly proportional to visual acuity. Further research is needed to reinforce the correlation between visual acuity and thickness of the nerve fibers in patients with DUSN to follow them after the treatment.

Keywords: Tomography, optical coherence; Optic nerve diseases; Nerve fibers/pathology; Optic neuritis/pathology; Retinitis/pathology; Eye infections, parasitic/pathology; Diagnostic techniques, ophthalmological

INTRODUCTION

Diffuse unilateral subacute neuroretinitis (DUSN) is an ocular infection disease caused by a nematode capable of causing loss of vision in one or, rarely, both eyes(1-4). It is most frequently seen in healthy children or young adults with no significant past ocular history. It is one of the main causes of unilateral blindness in Northeast Brazil(5). It is a diffuse uveitis characterized in the acute phase by swelling of the optic disc, recurrent crops of evanescent, multifocal, white-yellowish lesions at the outer retina and choroid level(6). Optic atrophy and severe retinal arterial narrowing seems to define best the late stage(1).

Optical coherence tomography (OCT) is a noncontact, noninvasive diagnostic technique that allows measurement of retinal nerve fiber layer (RNFL) thickness by in vivo visualization of the retina and RNFL with good reproducibility (7).

The purpose of the study is to evaluate retinal nerve fiber layer (RNFL) thickness using optic coherence tomography (OCT) in patients with DUSN with or without live worm and correlate it with visual acuity.

METHODS

Patients with unilateral DUSN diagnosis were included in this study, carried out between January, 2005 and December, 2006 at the Department...
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of Ophthalmology of the Federal University of Rio Grande do Norte, Brazil. This is a prospective study.

All subjects underwent a complete ophthalmologic examination, including the best corrected visual acuity, slit lamp examination, intraocular pressure and optic nerve retinal evaluation. Any other ocular disease was considered exclusion criterion. The contralateral eye was used as control group.

Subjects underwent ocular imaging with dilated pupils using Stratus OCT (Carl-Zeiss Meditec, Dublin, California, USA). Quality scans had to have focused images, signal strength ≥7, and a circular ring around the optic disc for RNFL scans. Average RNFL thickness (optic disc) protocol was used to obtain thickness measurements.

Statistical analysis was performed using Paired Student’s t test and Pearson’s correlation test. A significance level of 5% was set for all analyses.

Informed consent was obtained from all participants and the study was approved by the institutional ethics committee.

RESULTS

A total of 38 patients, aged 9 to 42 years, were included in the study, of whom 20 had live worm. Mean RNFL was 71.55 ± 27.26 in the DUSN eye and 103.07 ± 20.66 in the contralateral eye (p<0.001). Pearson’s correlation between visual acuity and RNFL was r= -0.522 (p<0.001) in the DUSN eye and r= -0.097 (p=0.509) in the contralateral eye.

The statistical analysis comparing the variables (Max-Min, Smax, Imax, Savg; Iavg, Avg thickness) between the DUSN eyes and the control group is shown in Table 1. DUSN eyes had a statistically significant decrease in RNFL when compared to the control group.

Pearson’s correlation test showed a decrease in RNFL directly proportional to the decrease in visual acuity converted to logMAR, with statistical significance in the parameters Max-Min, Smax, Imax, Savg, Iavg, Avg thickness (Table 2).

DISCUSSION

Only one case of strongly suspected clinical DUSN was histopathologically studied by Gass and SceIfo(8). The eye showed evidence of a nonspecific inflammatory process, involving the vitreous body, optic nerve, retina and choroid. Histopathologic data were not sufficient to explain visual loss in this case, which contributed to speculation about the role of functional mechanisms in causing visual damage(6). The mechanism of this phenomenon is explained by Oréfice et al. as being a consequence of possible inflammatory and/or toxic aggression towards retinal bipolar cells(9).

The Stratus OCT provides information on the probability of abnormal patient examination results after comparison with an internal normative database(10).

Table 3 illustrates a number of cases that show the correlation between RNFL thickness and visual acuity.

Statistical analysis showed that there is no significant difference between RNFL thickness in patients with or without live worm. However, there is statistical significance between decreased RNFL thickness and worse visual acuity.

Additional studies are needed to validate the use of this examination in the follow-up of patients whose worm was eliminated. This is particularly important in patients whose worm was not located and who were submitted to clinical treatment, so that fiber nerve atrophy can be accompanied.

RESUMO

Objetivo: Avaliar o uso do OCT3 (Carl-Zeiss) para medir a espessura da camada de fibras nervosas em pacientes com neu-
Table 2. Pearson’s correlation test between retinal nerve fiber layer and visual acuity converted to LogMAR

| Variables                      | Eye    | LogMAR of the affected eye | Initial evaluation 1 (p) |
|--------------------------------|--------|----------------------------|--------------------------|
| IMax/SMax (inferior/superior)  | Affected | r= 0.093                    | (p=0.081)                |
|                                | Healthy | r= 0.089                    | (p=0.681)                |
| SMax/Max (superior/inferior)   | Affected | r= 0.136                    | (p=0.415)                |
|                                | Healthy | r= 0.054                    | (p=0.749)                |
| SMax/Tavg (superior/inferior)  | Affected | r= 0.112                    | (p=0.501)                |
|                                | Healthy | r= 0.051                    | (p=0.763)                |
| IMax/Tavg (superior/inferior)  | Affected | r= 0.102                    | (p=0.542)                |
|                                | Healthy | r= 0.029                    | (p=0.864)                |
| SMax/Navg (superior/inferior)  | Affected | r= 0.091                    | (p=0.589)                |
|                                | Healthy | r= 0.065                    | (p=0.704)                |
| Max-Min (maximum-minimum)      | Affected | r= 0.400                    | (p=0.013*)               |
|                                | Healthy | r= 0.117                    | (p=0.489)                |
| SMax (superior maximum)        | Affected | r= 0.407                    | (p=0.011*)               |
|                                | Healthy | r= 0.005                    | (p=0.974)                |
| IMax (inferior maximum)        | Affected | r= 0.482                    | (p=0.002*)               |
|                                | Healthy | r= 0.227                    | (p=0.176)                |
| Savg (superior avg)            | Affected | r= 0.448                    | (p=0.005*)               |
|                                | Healthy | r= 0.113                    | (p=0.505)                |
| Iavg (inferior avg)            | Affected | r= 0.493                    | (p=0.002*)               |
|                                | Healthy | r= 0.074                    | (p=0.663)                |
| Avg.Thick (avg. thickness)     | Affected | r= 0.463                    | (p=0.003*)               |
|                                | Healthy | r= 0.011                    | (p=0.947)                |

(*) significant correlation at 5.0%

Table 3. Correlation between retinal nerve fiber layer and visual acuity

| Visual acuity | Thickness avg. | Visual acuity | Thickness avg. |
|---------------|----------------|---------------|----------------|
| HM            | 32.19          | CF            | 56.33          |
| HM            | 31.09          | CF            | 54.13          |
| HM            | 35.58          | CF            | 66.54          |
| HM            | 70.98          | 20/400        | 67.23          |
| HM            | 72.60          | 20/400        | 89.43          |
| CF            | 55.10          | 20/400        | 91.51          |
| CF            | 49.12          | 20/400        | 56.11          |
| CF            | 43.77          | 20/200        | 92.36          |
| CF            | 56.05          | 20/100        | 95.13          |
| CF            | 55.24          | 20/50         | 90.09          |
| CF            | 67.65          | 20/50         | 93.80          |
| CF            | 35.27          | 20/400        | 106.42         |

Correlation of Pearson between the acuity visual and the thickness of the retinal nerve fiber layer was r= -0.097 (p=0.509) in the contralateral eyes. Conclusion: The thickness of the retinal nerve fiber layer was correlated with visual acuity. A further study is necessary to confirm the correlation between the visual acuity and the thickness of the retinal nerve fiber layer in patients with DUSN with the aim of monitoring patients after treatment.

Descriptors: Tomography of Coherence Optic; Diffuse Unilateral Subacute Neuroretinitis; Retinitis; Infections Ocular Parasitic; Diagnostics of Ophthalmological

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