Retinal Nerve Fiber Layer Measurement in Patients with Optic Neuritis by Optical Coherent Tomography

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Intoduction. Optic neuritis (optic nerve inflammation) is the demyelinating inflammation of the optic nerve, which slows or blocks the transmission of signals to and from the brain. A gradual recovery of visual acuity over time is a characteristic of ON, which is characterized by painful, usually monocular visual loss with decreased visual acuity, defects of the visual field and colour vision [1]. The most important in ON development is the loss of axons, blocking nerve impulse signals or ganglion cell death [2]. ON causes are not known. Atypical ON is often caused by bacterial, fungal or viral infections, and other inflammatory or autoimmune diseases [3]. Typical ON is often associated with multiple sclerosis (MS), because of the same demyelinating processes in the brain [4]. Defective nerve signal transmission caused by the inflammatory process leads to type IV delayed hypersensitivity reaction, when activated peripheral T lymphocytes release cytokines and other inflammatory mediators that can move through the blood-brain barrier (BBB) and cause decomposition of myelin, nerve fiber layer and ganglion cell layer loss [5]. It is known that the damage of the BBB to T lymphocytes and inflammatory mediators access the central nervous system and indicates optic neuritis [6-8]. Ophthalmological evaluation by optical coherent tomography (OCT) may help diagnose ON more accurately and provide useful information for treatment.

Purpose. The purpose is to measure retinal nerve fiber layer (RNFL) by optical coherent tomography (OCT) in patients with optic neuritis (ON).

Methods. The study was carried out at the Department of Ophthalmology, Lithuanian University of Health Sciences (LUHS) with the Ethics Committee for Biomedical Research permission to undertake the study.

Fifthy three controls and 22 patients suffering from ON were included in the study. 44 eyes of 22 patients suffering from ON were included, and compared with 106 eyes of 53 age and gender matched controls. The inclusion criteria were as follows: 1) 2) patient's general good condition; 3) patient's consent to take part in the study.

The exclusion criteria were as follows: 1) contagious eye diseases, high degree of refraction defects, wall-eye, lens opacities (because of obscurity or poor photography quality of eye fundus), keratitis, acute or chronic uveitis in

anamnesis, glaucoma, optic nerve diseases, retina central part degenerations or dystrophy; 2) systemic disease (diabetes, oncological diseases, systemic connective tissue disease, chronic infectious disease, state of the tissue or organ transplant); 3) other localization of brain tumours; 4) any previous treatment of PA; 5) patient's refusal to participate in the study.

RNFL thickness was analysed with spectral domain OCT (RS 3000 Advance Nidec Co., Japan) after pupil dilatation. OCT image capture mode - disk circle mode: the patient's fundus is scanned circularly around the optic disk in the order of four 90 degrees quadrants which divide the measurements in four sectors: „Temporal", „Superior", „Nasal", and „Inferior" to obtain OCT images.

Results. Patients group consisted from 6 males and 16 females as control group consisted from 18 males and 45 females. The control and study group was matched for age and gender. RNFL thickness around the optic nerve head we measured in the first day of hospitalization before treatment with metilprednisolone. Our study revealed, that the mean values of temporal quadrant was statistically significantly lower in ON patients (69.05 vs. 80.64, p=0.047), comparing the mean value between patients with ON and the controls.

Table 1. The results of the study

RNFL layer thickness, µM	**Control group**	**ON group**	***P* Value, Control versus ON**	**Healthy eye of ON patients**	***P* Value, Control versus healthy eye of ON patients**
Superior	122.27±32.865	141.91±58.878	0.633	130.10±13.266	0.411
Temporal	80.64±44.525	69.05±32.077	0.047	69.55±8.111	0.301
Inferior	120.32±35.933	129.95±44.238	0.903	130.68±14.225	0.432
Nasal	86.55±26.430	96.59±38.548	0.079	80.66±12.096	0.319

Conclusion. OCT is useful device which can improve the diagnostic procedure of ON).

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Optic neuritis (optic nerve inflammation) is the demyelinating inflammation of the optic nerve, which slows or blocks the transmission of signals to and from the brain. RNFL thickness was analysed with spectral domain optical coherent tomography (OCT) imaging test after pupil dilatation. Our study results show that OCT is useful device which can improve optic neuritis diagnostic.