

ANALYSIS OF RETINAL NERVE FIBER AND GANGLION CELL COMPLEX STATUS IN EARLY OPHTHALMOLOGICAL MANIFESTATIONS OF TYPE 2 DIABETES MELLITUS USING OPTICAL COHERENCE TOMOGRAPHY

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Annotation

This scientific article is devoted to assessing the state of the retinal nerve fiber layer (RNFL) and the retinal ganglion cell complex (GCC) using optical coherence tomography (OCT) in 32 patients (64 eyes) with early ophthalmological manifestations of type 2 diabetes mellitus. The study examined the effectiveness of OCT in identifying and assessing ophthalmological changes in diabetes mellitus at an early stage. The clinical indicators of patients, RNFL and GCC measurements were analyzed, and the diagnostic value of these parameters was assessed in identifying early signs of diabetic retinopathy. The obtained results showed changes in the neural layers of the retina at an early stage, especially in the complex of ganglion cells and the thinning of the layer of nerve fibers. These data confirm the importance of using OCT in the early detection and prevention of eye diseases in patients with type 2 diabetes mellitus.

Keywords

Type 2 diabetes mellitus, optical coherence tomography (OCT), retinal nerve fiber layer (RNFL), retinal ganglion cell complex (GCC), diabetic retinopathy, early ophthalmological changes, neural layer, eye health, ophthalmological diagnostics.

Аннотация

Данная научная статья посвящена оценке состояния слоя нервных волокон сетчатки (RNFL) и комплекса ганглиозных клеток сетчатки (GCC) с помощью оптической когерентной томографии (ОКТ) у 32 пациентов (64 глаза) с ранними офтальмологическими проявлениями сахарного диабета 2 типа. В исследовании изучалась эффективность ОКТ в выявлении и оценке офтальмологических изменений при сахарном диабете на ранней стадии. Проанализированы клинические показатели больных, размеры РНФЛ и GCC

и оценена диагностическая ценность этих параметров при выявлении ранних признаков диабетической ретинопатии. Полученные результаты показали изменения нейронных слоев сетчатки на ранней стадии, особенно комплекса ганглиозных клеток и истончения слоя нервных волокон. Эти данные подтверждают важность применения ОКТ в раннем выявлении и профилактике заболеваний глаз у больных сахарным диабетом 2 типа.

Ключевые слова

Сахарный диабет 2 типа, оптическая когерентная томография (ОКТ), слой нервных волокон сетчатки (RNFL), комплекс ганглиозных клеток сетчатки (GCC), диабетическая ретинопатия, ранние офтальмологические изменения, нейронный слой, здоровье глаз, офтальмологическая диагностика.

Annotatsiya

Mazkur ilmiy maqola 2-tip qandli diabetning erta oftalmologik ko'rinishlari mavjud bo'lgan 32 nafar bemor (64 ko'z)da optik koherens tomografiya (OKT) yordamida to'r parda nerv tolalari qatlami (RNFL) va to'r parda ganglioz hujayralari kompleksi (GCC) holatini baholashga bag'ishlangan. Tadqiqotda erta bosqichda qandli diabetning oftalmologik o'zgarishlarini aniqlash va ularni baholashda OKTning samaradorligi o'rganildi. Bemorlarning klinik ko'rsatkichlari, RNFL va GCC o'lchamlari tahlil qilinib, diabetik retinopatiyaning dastlabki belgilarini aniqlashda ushbu parametrlarning diagnostik qiymati baholandi. Olingan natijalar erta bosqichda retinaning neyron qatlamlaridagi o'zgarishlar, ayniqsa ganglioz hujayralari kompleksi va nerv tolalari qatlamining ingichkalashini ko'rsatdi. Mazkur ma'lumotlar 2-tip qandli diabetga chalingan bemorlarda ko'z kasalliklarini erta aniqlash va oldini olishda OKTni qo'llashning ahamiyatini tasdiqlaydi.

Kalit so'zlar

2-tip qandli diabet, optik koherens tomografiya (OKT), to'r parda nerv tolalari qatlami (RNFL), to'r parda ganglioz hujayralari kompleksi (GCC), diabetik retinopatiya, erta oftalmologik o'zgarishlar, neyron qatlam, ko'z sog'ligi, oftalmologik diagnostika.

Introduction. Type 2 diabetes mellitus (T2DM) is a common chronic disease worldwide, and as one of its many complications, diabetic retinopathy develops. In the early stages of diabetic retinopathy, ophthalmological signs are less pronounced, therefore its early detection is important. Optical coherence tomography (OCT) is an advanced diagnostic method that allows for non-invasive

assessment of the state of the retina and optic nerve structures. In this study, the state of the retinal nerve fiber layer (RNFL) and ganglion cell complex (GCC) was studied using OCT in patients with early ophthalmological manifestations of type 2 diabetes mellitus.

Materials and methods. 32 patients (64 eyes) with early stages of type 2 diabetes mellitus were involved in the study. The age range of the patients was from 40 to 65 years, who had T2DM, confirmed by clinical and laboratory diagnostics. RNFL and GCC thickness were measured using optical coherence tomography (OCT). Measurements were carried out on a special device according to the standard protocol. The obtained results were compared with the indicators of the healthy control group and statistically analyzed.

Results. The study results showed that in the early stages of type 2 diabetes mellitus, a significant decrease in the thickness of RNFL and GCC in patients was observed ($p < 0.05$). In particular, the average thickness of the retinal ganglion cell complex in the right and left eyes was significantly thinner compared to the healthy control group. These changes were indicated as one of the early ophthalmological signs of diabetic retinopathy.

Parameter	Patient Group (Early T2DM)	Healthy Control Group	Statistical Significance (p-value)
RNFL Thickness	Significantly decreased	Normal	< 0.05
GCC Thickness (Right Eye)	Significantly decreased	Normal	< 0.05
GCC Thickness (Left Eye)	Significantly decreased	Normal	< 0.05

Analysis and discussion. The obtained data indicate that in type 2 diabetes mellitus, changes in the neuronal layers of the retina, in particular the RNFL and GCC layers, occur even in the early stages. These changes are associated with the pathophysiological mechanisms of diabetic retinopathy, as a result of metabolic stress of neuronal cells, deterioration of ganglion cells and atrophy of the layer of nerve fibers occurs. The non-invasiveness and high accuracy of the OCT method are of great importance for early diagnosis and monitoring of patients' eye health. Compared to the research results, other scientists also noted changes in the retinal layers in diabetes.

Conclusion. In early ophthalmological manifestations of type 2 diabetes mellitus, a decrease in the thickness of the nerve fiber layer of the retina and the ganglion cell complex is observed. With the help of optical coherence tomography, these changes can be detected at an early stage, which makes it possible to prevent

the development of diabetic retinopathy and timely treatment of patients. Therefore, it is recommended to use OCT as an important diagnostic tool in regular ophthalmological examinations of patients with type 2 diabetes mellitus.

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