STRUCTURE, FUNCTION AND OCULAR BLOOD FLOW EVALUATION IN GLAUCOMA DIAGNOSIS

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A reduction in the retinal nerve fiber layer thickness (RNFLT) is an early sign of glaucoma, and a significant reduction in the retinal ganglion cells density can occur before visual fields (VF) deficits are detected (1). Therefore, developing methods to quantify the early morphologic changes of the RNFL thickness could lead to earlier detection of glaucoma (2, 3). It is has been postulated, that ocular blood flow and choroid are of great importance in the development of the disease (4, 5).

Methods:

30 normal eyes and 32 eyes with preperimetric glaucoma were analyzed in the present study.

The thickness of the ganglion cell complex (GCC), retinal nerve fiber layer (RNFL) and choroidal thickness (ChT) were measured using RTVueSD-OCT images.

Perimetry – using Humphrey test (Carl Zeiss Meditec, Dublin, CA).

Ocular blood flow velocity was measured by the color Doppler mapping (VOLUSON 730 ProSystem).

Intraocular pressure (IOPcc) and corneal hysteresis (CH) were determined using Ocular Response Analyzer (ORA).

Standardized statistics (Z-value) of Wilcoxon-Mann-Whitney rank sum test and the area (S-ROC) under the receiver operating characteristic curve for logistic regression model was used to determine the most important diagnostic criteria in glaucoma.

Indicators with the highest value

Parameter	Z-Value	P-Value	S-ROC	S-ROC inf	S-ROC sup
Vortex vein, V mean, sm/s	5,348	<0,0001	1,000	1,000	1,000
Central retinal vein, V diast, sm/s	3,737	0,0001	0,849	0,715	0,983
Central retinal artery, V diast, sm/s	2,735	0,006	0,730	0,582	0,878
Temporal posterior ciliary arteries, V diast, sm/s	2,528	0,011	0,711	0,566	0,857
IOP, mm Hg	-2,906	0,003	0,741	0,593	0,833
Corneal hysteresis, mm Hg	2,239	0,025	0,686	0,539	0,833
MD, dB	2,652	0,007	0,72	0,581	0,860
Peripapillar ChT, mkm	-2,276	0,022	0,689	0,545	0,833
Avg. GCC, mkm	2,050	0,041	0,670	0.513	0,837
FLV, %	-1,862	0,064	0,655	0,493	0,816

Results:

The largest S-ROC curves and z-values were:

the mean BFV in the vortex vein and central retinal vein, end diastolic BFV in the central retinal artery and temporal posterior ciliary arteries,

intraocular pressure (IOP),

perimetric index Mean Deviation (MD),

corneal hysteresis (CH),

peripapillar ChT,

average GCC thickness and FLV.

Conclusions:

The evaluation of the ocular circulation, MD, SD-OCT-derived macular GCC thickness and peripapillar ChT, corneal hysteresis and IOP can be used in discriminating glaucomatous eyes from the normal eyes.

References

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The appearence of central retinai vien in pre-perimetric glaucoma