

POTENTIAL ROLE OF AI IN DIAGNOSIS OF LOW TENSION GLAUCOMA

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Glaucoma represents a heterogeneous group of conditions with significant difference in pathogenesis, clinical characteristics, IOP levels, treatment approach and progression. It is a very complex disease without agreed upon diagnostic and classification criteria. Elevated intraocular pressure is main risk factor, and many treatment modalities are efficient for its reduction.

Very difficult diagnostic problem is caused by development of glaucomatous damage in patients that never had IOP above 21mmHg – so called Low Tension Glaucoma (LTG). The great value of Artificial Intelligence (AI) is the possibility to process and analyze multiple data from clinical exams and diagnostic testing. For onset and prognosis of LTG, systemic risk factors are more important. We hope AI to help in diagnostic definition for this dangerous glaucoma form, demonstrated in approximately 1/3 of patients.

We performed retrospective clinical study of all LTG patients diagnosed and treated for 2 years period. Diagnosis was based on presence of glaucomatous nerve head damage, retinal nerve fiber layer (RNFL) thinning, characteristic visual field defects, and maximal intraocular pressure (IOP) < 21mmHg. Additionally RR holter exam and Doppler echography were performed on selected patients, as well as consultations with cardiologist, neurologist and endocrinologist. Follow up period: 6-18 months. Disease progression was demonstrated in 65% of patients even after IOP decrease to 15-17mmHg. Most common findings were unstable blood pressure with nocturnal dips and IOP fluctuation.

Two metabolic phenotypes were observed. In the 1st group are patients in younger age who demonstrated signs of abnormal vasoregulation: Reynaud syndrome, migraine headache, systemic hypotension, cold hands and feet. Patients from 2nd group are older (around 80) with multiple systemic vascular problems, extreme fluctuations of RR and IOP, as well as cognitive problems.

The major concern is how to define LTG, and AI could help to reach unified diagnostic definition. We suggest for a need of new criteria for this glaucoma form – max IOP <15-18mmHg. Our studies support the vascular hypothesis for LTG development and progression. This glaucoma form is extremely challenging and mysterious, and both phenotypes group are mostly associated with ocular perfusion problems.