**Screening Open Angle Glaucoma in Type 2 Diabetes**

Lígia Figueiredo¹, Dália Meira¹, A.C. Braga², Joaquim Sequeira¹, Luís Agrelos¹

¹Department of Ophthalmology, Centro Hospitalar de Vila Nova de Gaia / Espinho EPE-Portugal
²Production and Systems Engineering Department, Engineering School, University of Minho, Portugal

**Introduction**

Glaucoma is the leading cause of irreversible blindness worldwide. The number of persons with glaucomatous optic neuropathy worldwide is expected to increase 2.8% per year until 2025, because of aging populations. Open-angle glaucoma (OAG) is a progressive, chronic optic neuropathy in adults in which there is a characteristic acquired optic nerve atrophy, loss of retinal ganglion cells and their axons. OAG has substantial impact on the individual’s vision related quality of life.

**Known risk factors for glaucoma include elevated intraocular pressure (IOP), age, race, myopia, family history and pseudoxfoliation syndrome.**

People, predominantly white, with Type 2 Diabetes Mellitus (T2DM) have an independent higher risk factor (1.5 – 2.0 fold greater odds) of having OAG, than those without T2DM, based on the Beaver Dam Eye Study, Blue Mountains Eye Study, and NHS report.

Current recommendations for screening OAG remain evasive, but selective screening in high-risk groups seems a more cost-effective option than comprehensive, population-based screening.

The clinical benefits of screening diabetic retinopathy (DR) have long been recognize, and DR screening is a well established cost-effective program. So screening programs for DR are an excellent opportunity for screening OAG in a high risk group, implementing additional testing.

**Purpose**

To validate a screening method for OAG, running along with the diabetic retinopathy screening program.

**Methods**

Retrospective cross-sectional study. People with T2DM screened for diabetic retinopathy between 2008 and 2010, were submitted to a two-stage screening method for OAG. The first tests were short questionnaire (myopia, family history of glaucoma/ocular hypertension), IOP measurement (Goldmann tonometry) and fundus monoscopic photograph. Those who tested positive in the first stage were referred for a complete eye examination by an ophthalmologist and scanning of the peripapillary retinal nerve fiber layer with GDx-VCC. Based on an ophthalmoscopic examination, pachymetry and static automated perimetry, eyes were classified into 3 categories: healthy, glaucoma suspect and definitive glaucoma. Patients were diagnosed with glaucoma suspect if they had ocular hypertension (OH) with a normal pachymetry and/or visual field and/or optic and/or nerve fiber layer normal/suspicious, with at least one being suspicious. Definitive glaucoma was diagnosed if there was an optic neuropathy characteristic of glaucoma and/or visual field with glaucomatous defect.

**Statistical Analyses**

Demographic data was analyzed with SPSS. Receiver operating characteristic (ROC) curves were constructed for the GDx-VCC parameters and then calculated the area under the ROC curves (AUC) to seek for the best discriminating parameter. Sensitivity and specificity for detecting OAG were determined.

**Results**

One eye per subject was randomly selected, if both eyes were eligible. After excluding eyes with missing data or with poor quality scans, the data of 185 eyes was analyzed.

**Conclusion**

Screening to detect glaucomatous optic neuropathy, either by structural or functional testing, using a single test or a combination of tests, remains an unsolved challenge, despite recent improvements in technology.

Screening OAG along with diabetic retinopathy program, seems valuable. This two-stage approach screening detected a prevalence of 20% of OAG in this high risk diabetic population. The GDx-VCC allowed accurate discrimination between healthy and definitive glaucomatous eyes, and seems to fulfill the criteria for glaucoma screening device in this particular population.

The results of our study should be interpreted in light of potential limitations, including the risk of diagnostic bias. But, one strength of our study is that we enrolled participants representative of those expected to encounter in the proposed screening setting. Important questions remain unanswered: (1) Is it cost-effective? and (2) does it lead to less visual impairment?