STANDARD COMPUTERIZED PERIMETRY IN FUNCTION OF DIAGNOSTIC GLAUCOMA

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Abstract

Glaucoma is a slowly progressive neuropathy with changes in the optic nerve, retinal neurofibrillary layer (RNFL) and visual field.

Aim of this study is to present the significance of standard computerized perimetry in early detection of changes in the visual field in patients with glaucoma.

The latest WHO estimates that worldwide cancer in the first place, cardiovascular disease - second and blindness is the third challenge to solve global level. The glaucoma accounts for about 9-12% of all blind people in the world, that the disease is diagnosed in about 2.5 million people each year. WHO forecasts that the percentage will rise even to 30% by 2020.

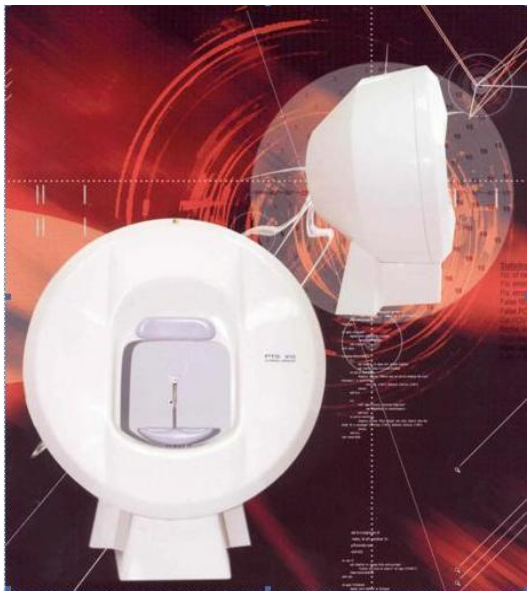
The right and on time diagnosis of the glaucoma and the efficient treatment is the only mechanism in the fight against this illness. The new methods offer us a number of new opportunities for monitoring the earliest changes of the disc of the optic nerve and retinal neurofibrillary layer. Their use should be combined with the classical methods for examination of glaucoma such as standard computer parametry

***Key words**: glaucoma, standard computerized perimetry*

Introduction

In the last decade we have increased progress in diagnosing glaucoma thanks to technological development and the occurrence of new modern apparatus in the everyday ophthalmology practice. The new methods enable quick, precise and timely diagnosis of this disease, that if now detected on time can lead to blindness.

The definition promoted in 2014 by the European glaucoma society (EGS 2014): "Glaucoma is a chronical progressive optical neuropathy with characteristic morphological changes on the desk of the optical nerve and retinal neurofibrillary layer as well as progressive death of ganglion cells with loss of sight in the absence of other eye diseases and congenital anomalies". Beside the standard methods that were open to our disposal, such as measuring the level of intraocular pressure (IOP), gonioscopy, examination of the eye fundus, as well as determining and monitoring of the visual acuity, the need of computerized perimetry and optical coherent tomography of the ocular posterior segment has become essential. We are using this opportunity to focus complexly to the standard computer perimetry, its importance and its capabilities in the early diagnosing of glaucoma.



Pictures 1 and 2. Standard computerized parametry type Optopol PTS 910

The ophthalmology department in the Clinical hospital Shtip received the most modern apparatus for parametry in 2011, the same has been put into function for early detection in changes in the visual field of patients. To this day about forty computerized parametries are performed every month, i.e. approximately 3000 examinations have been performed to our patients.

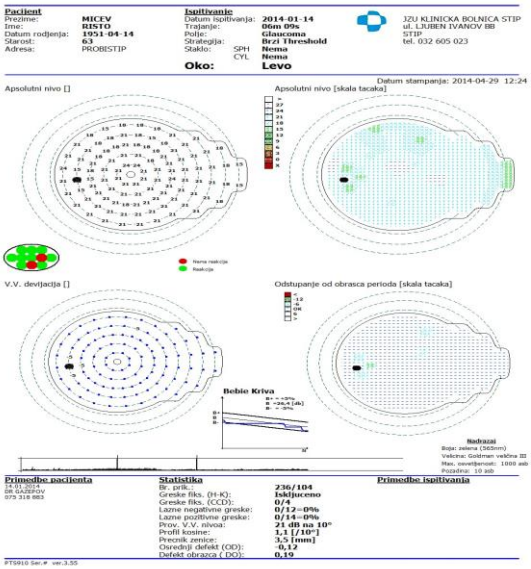
In accordance to the modern ophthalmology protocol, every patient that has an increased IOP a computerized parametry must be performed once a year. To patients that have significant changes in the visual field a computerized parametry could be performed every six months and the findings about the visual fields are compared. With stable patients with minimal changes in the visual field it can be performed less often. Measuring the IOP is a routine and obligatory examination performed to all patients in our ambulance. In this manner we easily detect the risky patients and patients with initial glaucoma, that in a large number of cases in asymptomatic. The glaucoma, after the cataract is one of the most common pathological conditions that ophthalmologist meet in everyday practice. (1,2,3).

The latest estimates of WHO (World health organization) are the on a global level cancer takes the first position, the cardiovascular illnesses second and blindness takes the third position as global challenges that should be addressed. The Glaucoma impacts 9-12% of the people that have blindness in the world, i.e. 2,5 million people every year. WHO predicts that the percentage with rise to 30% by the year 2020.

From this the need for improvement in diagnosing and grading this disease is understandable. Glaucoma develops slowly and undetectably, usually impacting both eyes, the changes are often symmetric, but they can also be asymmetric. (7,8,9). Because of this many people are calling this disease “The silent killer of sight”.

The diagnosis is given based on a combination of clinical findings: Intraocular pressure (IOP), morphological grade and structure of the disk of the optical nerve (DON) retinal neurofibrillary layer (RNFL), changes in the function (a variety of methods and programs for

examination of the visual sight) and risk factor grade. (10,11)



Picture 3. The final report from a Optopol PTS 910

Characteristics of computer parametry, method of examination and interpretation of the received findings.

The computer parametry Optopol PTS 910 is fitted with a vanguard and intelligent software for parametry. (Pictures 1 and 2) The digital algorithm that is implemented in the system, allows the detection of different defects in the visual field of the patient. The parametry searches for an automatic reaction of the patient during the examinations and it adapts to that reaction. This shortens the examination time. The computer controls the fixation of the patient during the examination using two methods- through a CCD camera that searches for the pupil and simultaneously stimulates the blind spot. Looking at the eye on the screen presents an additional direct visual control.

The final report of the Optopol PTS 910 consists of three panels. (picture 3). The top part holds general information about the patient and the strategy that is used during the examination. The middle part consists of graphical displayed changes, by using different colors the changes are clearly visible. There is a graph that only notes the changes, so we can immediately the condition of the eye. These changes can be seen by the examiner on a screen in three dimensions (3D). In the lower part all of the changes that are received during the examination are expressed numerically, as well as the false positive and false negative faults, in order for every eventual faults to be exempt during the examination itself. The examination is done in a darkened room and full concentration is required by the examinee.

Particularly important for the analysis: examination of the "Bebbie curve", (PD) index and (MD) index.

The Bebbie curve- With the help of the "Bebbie" curve we can easily and effectively see the quality of the made parametry of the patient. The "Bebbie" curve is formed by calculating the sensitivity of every examined point in a descending order. The records are made starting from the highest sensitive to the least sensitive points, and that is why the curve is always in a descending

order. Based on more than 50 000 results from patients the values of the relevant tolerant is defined and redefined. The zone grades as +/- describes 90% of the healthy population. Depending on the type of curve, height, descending type, sharpness and ending points, the type of the specific examination is determined. The "Bebbie" curve of a healthy patient should be between + Vo and –Vo. With the help of the "Bebbie" curve as well as the additional index PD and MD we can receive important diagnostic information. The curve gives a enough accurate indicator about the quality/ reliability/ of the conducted examination itself.

MD index- This parametry determines the loss of sensitivity, that is marked as the difference between the ideal profile regarding the patients age and the received result from the examination. This index can be calculated with the border and rapid border strategy. It can vary in the border from -1 to +1. The value -1 signifies sensitivity two times lower that the expected sensitivity for that age. If the age norm for the patient is 24 dB for a 10 degree ring, his real sensitivity will be 12 dB for 10 degree ring.

PD index- This parametry gives us an idea of the volume condition of the optical profile. In general, it determines the quantitative and depth scotoma compared to the typical standard/ pattern/ sensitivity. The Zero vale means that the profile is smooth and without local defects. For higher values, we are talking about more and deeper local defects.

With this apparatus beside examination of the visual field, we can examine the macula (the center of clear sight), the periphery and the central sight that is extremely important for drivers of motor vehicles and pilots. (12) Now we can precisely follow all of the changes of the visual field and compare the same with the previous findings. This apparatus as an option and automatic software that discards the differences from the previous and current visual field. In this manned the Ophthalmologist has a clear picture of the condition of the patient and the manner of therapeutic treatment, regardless if it is conservative or operative, and most recently by putting implants that regulate intraocular pressure (IOP). Most important is the assessment of every patient individually, with a goal of saving the good visual sharpness as long as possible, i.e. allowing our patient with glaucoma to have a normal, quality life without any type of handicap.

Conclusion

The right and on time diagnosis of the glaucoma and the efficient treatment is the only mechanism in the fight against this illness. The new methods offer us a number of new opportunities for monitoring the earliest changes of the disc of the optic nerve and retinal neurofibrillary layer. Their use should be combined with the classical methods for examination of glaucoma such as standard computer parametry.

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