Implications of the ocular pulse amplitude in ocular hypertension and different types of glaucoma with respect to morphological and functional parameters

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Purpose:
Several studies have proven that intraocular pressure is not the only reason for progression of glaucoma. Meanwhile, the relevance of disturbed ocular blood circulation and the loss of autoregulation attract wide interest in pathogenesis of glaucoma. In our study we assessed the relationship between ocular pulse amplitude (OPA) and the morphological changes of optic disc as well as functional defects of the visual field in different types of glaucoma and ocular hypertension. Furthermore, we tested the effect of OPA under consideration of general diseases.

Patients and Methods:
In our prospective study we included a total of 172 patients with manifest glaucoma: 75 with primary open-angle glaucoma (POAG), 12 with pseudoexfoliation glaucoma (PEX), 45 with normal tension glaucoma (NTG) and 40 patients with ocular hypertension (OHT). All patients were examined with the dynamic contour tonometry (DCT, PASCAL®), Heidelberg retina tomography (HRT) and Octopus visual field analyzer (program 30-II). The correlation between OPA and optic disc area, optic disc cup size and mean defect (MD) were tested by means of Pearson's correlation coefficient. The impact of different general diseases on OPA was tested by use of the Mann-Whitney test in the total population and in the different diagnosis groups.

Results:
There was a significant difference in OPA levels shown between the groups, OPA was found to be highest in the OHT (2.95±0.8mmHg) and lowest in the NTG group (2.06±0.68mmHg) (Fig. 1).

OPA correlated inversely with the optic disc area in the POAG and PEX group (p<0.05) (Fig. 2). The smallest optic disc areas were found in the PEX group. A highly statistically significant inverse correlation was also seen between OPA and optic disc cup size in the PEX group (p<0.01) (Fig. 3). In patients with POAG we observed a significant effect of diabetes mellitus on OPA, compared to the healthy patients of this group (p=0.002) (Fig. 4). Furthermore, an important difference of OPA levels existed between healthy patients and those with hypertonia in the group of OHT (p=0.003) (Fig. 5).

Conclusions:
In our study we could demonstrate that the optic disc area may affect the ocular pulse amplitude and that general diseases could have an important effect on OPA. Therefore, the measurement of OPA in glaucoma patients, with or without general diseases, seems to be a suitable method to determine differences of ocular hemodynamics in different sized discs.

References: