

Vascular dysregulation in altitudinal visual field defects in glaucoma

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Abstract:

Purpose:

To compare retinal vessel response to flicker light between primary open angle glaucoma (POAG) subjects and normal control subjects and to study the relationship between the topography of the retinal vessel dysregulation and localized visual field defects.

Method:

Thirty subjects with POAG and twenty-two age, gender- matched control subjects were enrolled. Retinal vessel response was measured by dynamic vessel analyzer (DVA) in both groups. The compound pictures of visual field tests and retina pictures were digitally generated. The vessel segments were divided into three groups according to the severities of visual field defect presented by the compound pictures. The comparisons among POAG and control groups, glaucomatous lesion severities groups, branch level groups were drawn.

Results:

Flicker-induced venous maximal dilation and constriction were significantly enhanced in POAG group compared to control ($P < 0.001$). Venous maximal dilation in moderate defect group was the smallest, severe group was the largest and mild group was in between ($P = 0.029$). Artery showed same tendency but the differences were not significant. The time of maximal dilation of arteries delayed as the branch level went up from 13.4 ± 3.4 to 10.9 ± 3.4 second ($P = 0.019$). So did the veins, from 16.2 ± 3.9 to 12.5 ± 4.3 second ($P = 0.008$). The small glaucomatous veins (branch 3 and 4) had markedly larger maximal vessel dilation ($P = 0.019$ and 0.012) and AUC ($P = 0.012$ and 0.005) than healthy ones while the bigger glaucomatous veins had markedly smaller constriction ($P = 0.006$ and $P < 0.001$).

Conclusion:

Flicker-induced retinal vessel response in POAG was enhanced compared with normal control. The small veins in severe defect area showed the largest vessel response and the moderate area vessel showed the mildest change. It indicates small veins played an important role in glaucomatous optic nerve process.