**Purpose**

Do specific metamorphopsia patterns reflect conversion to late age-related macular degeneration?

**Methods**

35 patients with intermediate age-related macular degeneration (i-AMD) were followed in a prospective, longitudinal study from 2015-2017.

Eyes were classified as:

- non-progressors (np) when intermediate AMD did not proceed to late AMD
- progressors (p) when neovascular AMD (n-AMD) or geographic atrophy (GA) when geographic atrophy developed.

The first eye converting to late AMD was included. In binocular np - cases one eye was randomly included.

Inclusion criteria: intermediate AMD

Exclusion criteria: ancillary macular pathology

Zero (alternative) hypothesis: progression to n-AMD or GA does not (resp. does) change metamorphopsia value and pattern.

Metamorphopsia measurement performed with AMD – A Metamorphopsia Detector (appleyes®) documenting magnitude (d), localization (x), area (a), local frequency (f) of metamorphopsia and global metamorphopsia index (MI). The software is based on the Amsler grid and uses a concept of a negative image: distorted lines can be straightened with the mouse.

Guideline compliant ophthalmological exams were performed. This research adhered to the tenets of the Declaration of Helsinki and was approved by the ethics commission in charge. Prior to the study all participants signed informed consent.

**Literature**


**Results**

Mean change of metamorphopsia index was significantly higher in progressors (5.80, SD 2.71, 95% confidence interval (CI) [3.93, 7.68]) compared to non-progressors (2.18, SD 2.62, CI [1.27, 3.08]), t-test, p < 0.05. A p-value of 7.73 lead to rejection of the zero hypothesis. 7 patients were lost to follow-up. In this cohort (28 eyes: 8 men, 20 women) mean age was 74 (SD 4.2) years in the p-AMD-group and 75 (SD 5.1) in the np-group. Mean study period was 10.0 months (SD 4.0) in the p-AMD-group and 10.7 months (SD 6.1) in the np-group.

19 eyes (68%) remained stable (i-AMD), 9 eyes (32%) progressed to late AMD: 8 eyes (28.5%) developed neovascular AMD; 1 eye (3.5%) developed geographic atrophy.

**Mean change of Subindices**

Mean change for Δ, a and d was 3.34 (SD 1.45) / 1.44 (SD 1.22) / 0.26 (SD 1.25) / 1.59 (SD 0.76) in the p-AMD and 1.10 (SD 1.14) / 0.62 (SD 1.10) / 0.47 (SD 0.71) / 0.87 (SD 0.73) in the np-AMD. In GA the difference of Δ, a and d was 2.60, 1.33, 0.63 and 0.66.

**Mean Change of CFT**

Mean change of CFT was +40 μm (SD 60) in the p-AMD, -33 μm in GA and -3 μm (SD 63) in the np-AMD.

**Conclusion**

The results support the hypothesis that progression from intermediate to neovascular age-related macular degeneration is accompanied by an increase of metamorphopsia index.

**Discussion**

- The conclusion that conversion is accompanied by an increased metamorphopsia index is applicable for neovascular AMD due to dominance of progressors to n-AMD in this case.
- Only one patient developed geographic atrophy, accompanied by decrease in metamorphopsia index and development of central scotoma. Vision-related quality of life might reveal the impact of metamorphopsia or central scotoma respectively.
- Long-term studies could evaluate the role of metamorphopsia measurement as a biomarker for conversion from intermediate to neovascular AMD and the suitability of AMD – A Metamorphopsia Detector® as a (home) monitoring test.