COMPARISON BETWEEN OPTIC NERVE HEAD TOPOGRAPHY – USING THE HEIDELBERG RETINA TOMOGRAPH – AND RESOLUTION VISUAL FIELDS

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Introduction

Early diagnosis is probably essential for the outcome of glaucoma treatment, and a number of methods for detecting glaucomatous damage have been developed and evaluated¹. Resolution perimetry (HRP)²,³, measuring spatial resolution, is one of the methods with the highest sensitivity¹. It has been found to be reliable and useful in the management and follow-up of glaucoma⁴¹⁰.

Another way of detecting early glaucomatous damage is by computerized analysis of optic nerve head topography, measured by scanning laser tomography¹¹. The Heidelberg Retina Tomograph (HRT) provides rapid measurements of optic disc topography on a point-by-point basis, and calculates a variety of disc parameters¹². The reproducibility and repeatability are reported to be good¹³,¹⁴.

The aims of the present study were to evaluate the repeatability of the HRT technique and to investigate the concordance between the results obtained with the HRT and the HRP in patients with glaucoma.

Subjects and methods

Fifty patients were examined because of glaucoma, suspected glaucoma or ocular hypertension in one (n=19) or both (n=31) eyes. The repeatability of the HRT classifications was estimated by erasing and redrawing the contour lines. The original drawings were made by different examiners, and the re-drawings by one well-trained technician. Concordance was evaluated between the results of the automatic classification, normal/glaucoma, performed by the software of the Heidelberg Retina Tomograph¹⁵, and abnormality (general threshold increase, local deviation and/or hemifield or quadrant defects) in resolution visual fields, automatically calculated by the software of the perimetric system¹⁶.

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Results

Intra- and inter-examiner variability

The influence of the intra- and inter-examiner variability regarding the software’s classifications is shown in Table 1. One recording had been deleted from the database and could not be recalculated, and so the test was carried out on 80 eyes.

The intra-examiner variability, i.e., the mean difference in classification values, was 0.57 (28%) when the same examiner made both contour lines, and the inter-examiner variability, when another examiner made the second contour line, was 1.03 (55%). With regard to the free-hand drawings \( n=34 \), the mean difference between classification values was 0.4 (18%). In no case did the HRT classification change. Using the circular contour line \( n=46 \), provided by the software, the difference was 1.04 (54%). Five reclassifications occurred with the use of this procedure.

Concordance between HRT and HRP results

The agreement between HRT and HRP classifications in all eyes was 73% (58/79) (data from two eyes were missing). In 66% (19/29) of patients, both tests corresponded in both eyes, and in 90% (26/29), in at least in one eye.

The limit between glaucoma and normality for the HRT classification values was set to zero. The corresponding value for HRP, calculated from the regression line, was 5.99dB, which was similar to the population mean +2 SD, i.e., 5.8dB. Figure 1 shows the relationship between HRP mean scores and HRT classification values.

Discussion

Recent data have indicated that differences in contour line alignment between sequential images might be an important source of test-retest variability between sequential images\(^{17,18} \). In this study, we recorded the intra- and inter-examiner variability in drawing the contour line in order to find out if this could influence the HRT classifications. The variability was nearly twice as large between examiners (55%), compared to intra-examiner variability (28%). The HRT classification changed in five eyes when the standard contour line was used. The differences between values were much smaller when the free-hand technique was used, and no change in classification was observed. These results indicate the importance of using the same well-trained examiner, especially in follow-up, and that free-hand drawings are preferable to the standard contour line provided by the system.

The agreement between the classifications of optic nerve topography changes, ana-
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lyzed with the HRT and HRP abnormalities, was good. The reasons for differing results from these two examinations are currently being investigated.

The full study will be published elsewhere.

References


Fig. 1. HRT classification values versus HRP mean score, $r = 0.7$, $p<0.0001$. Solid line: linear regression; dashed lines: 95% confidence limits.