Intra-visit and inter-visit variability of optical coherence tomography measurements of retinal nerve fibre layer thickness in a Glaucoma clinic

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Introduction

Measurement of the retinal nerve fibre layer thickness (RNFLT) using optical coherence tomography (OCT) can be used to monitor the progression of glaucoma. However, this is complicated by the test-retest variability in RNFLT measurements.

To allow an accurate assessment of glaucomatous progression, the range of variability should be significantly less than the change in thickness deemed to represent clinically significant change.

Aims

- To quantify the intra-visit variability of RNFLT measurements in our clinic
- To investigate whether the use of the mean measurements of two follow-up scans taken at the same visit was more reliable than the use of a single follow-up scan in the assessment of change in RNFLT

Methods

All patients who underwent OCT RNFL measurement on attendance at the Glaucoma clinic at Queen Elizabeth University Hospital between 01/11/19 - 11/11/20 were identified.

OCT RNFL images were taken using the TopCon imaging system. Intra-visit variability was assessed by comparing measurement from two separate images of the same eye taken at the same visit. Inter-visit variability was assessed by comparing the change on the first follow-up image to the change on a mean of two follow-up images taken at the same visit.

Clinically significant change (CSC) was defined as a change of ≥8 microns within a quadrant.

Scans were excluded if they met any of the following criteria: image quality of less than 35 for the baseline or follow-up scan, movement artefact, or decentration of the scan.

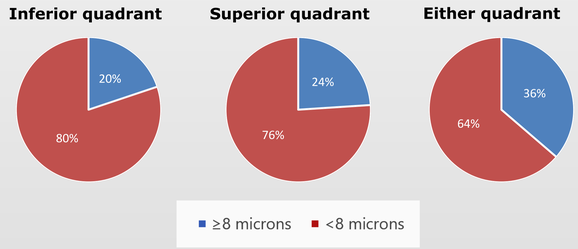
Results

Intra-visit variability (n = 146 eyes)

Test-retest mean difference in RNFLT

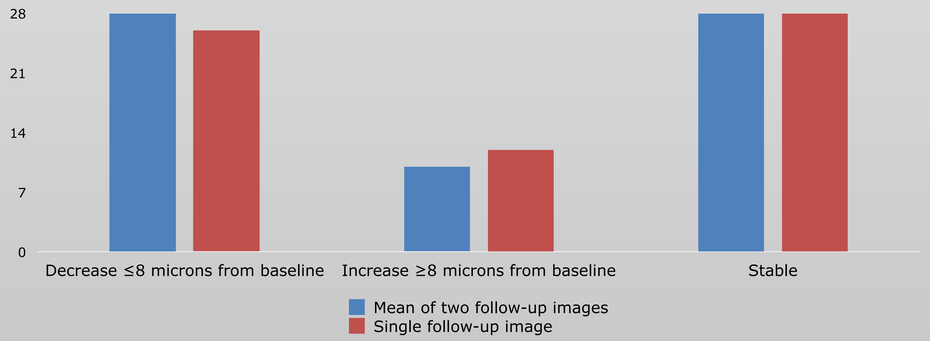
- 5±6 microns in the inferior quadrant
- 5±5 microns in the superior quadrant

Test-retest variability of ≥8 microns in RNFLT



Inter-visit variability (n = 66 eyes)

- There was a clinically significant worsening in 26 (39%) eyes using the first of two follow-up images and in 28 (42%) eyes using the mean measurements on two follow-up scans.
- There was an increase in RNFLT larger than CSC in 12 (18%) eyes using the first of two follow-up images and 10 (15%) eyes using the mean measurements on two follow-up scans.
- There were 28 (42%) eyes that were stable - no change in RNFLT larger than CSC



Conclusion

In our study population, the test-retest variability was equal to or greater than CSC in RNFLT in at least one-fifth of scans.

Using the mean measurement of two scans taken at the same visit may increase the sensitivity of identifying true CSC and reduce the risk of erroneous increases in RNFLT. However, a larger sample size is required to confirm these findings.

References

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