Clinical Area: Ophthalmology
Keywords: scanning laser polarimeter; eye; nerve fiber layer analyzer
Reference: *Hoh et al. Optical cohorence tomography and scanning laser polarimetry in normal, ocular, and glaucomatous eyes. Am J Ophthalmol 2000;129:129-135.*

Study Type: Case Series
Study Aim: To evaluate the relationship between visual function and retinal nerve fiber layer measurements obtained with scanning laser polarimetry and optical coherence tomography.

Outcomes

- *Primary:* ability of scanning laser polarimetry and optical coherence tomography to distinguish between glaucomatous and nonglaucomatous populations.
- *Secondary:*

Design

- *Number of subjects:* 78 patients, 78 eyes
- *Method of subject selection (inclusion/exclusion criteria):* All patients were between 20 and 75 years old; had visual acuity of 20/40 or better; refractive error not exceeding 5 diopters sphere and/or 2 diopters cylinder, and no prior incisional surgery. Eyes with co-existing retinal disease, uveitis, peripapillary atrophy extending to 1.7mm from disk center, or non-glaucomatous optic neuropathy were excluded from this investigation. When patients had 2 eligible eyes, only the right eye was enrolled.
- *Consecutive patients?* Yes.
- *Description of study population:* mean age = 56.8+11.5 years (range = 26 to 75). There were more females than males and the participants were mostly white. Patients with glaucoma tended to be older than normal and ocular hypertensive patients.
- *Exposure/Intervention:* Scanning laser polarimetry, optical coherence tomography, and automated achromatic perimetry were performed. All imaging studies were completed within 1 month of clinical examination by one of two experienced operators.

  Normal patients (n=17) had no history of ocular disease. Ocular hypertension (n=23) was defined as an intraocular pressure ≥25mm Hg on at least two separate occasions. Glaucomatous patients (n=38) had glaucomatous optic nerve damage and associated achromatic visual field loss in the corresponding hemifield location.
- *Source of outcome data (e.g. patient self-report, doctor report, lab results):* Reports, "lab" results.
- *Length of follow-up:* N/A
- *Completeness of follow-up:* N/A

Validity

- *Is the study type appropriate for the question(s) being asked?* No, a randomized controlled trial provides the highest grade of evidence.
- *Were patients similar with respect to baseline characteristics?* There were no differences between the 3 study groups with respect to gender, race, and refraction, but glaucomatous patients tended to be older than both the normal and ocular hypertensive patients (p=0.02)
- *Was the intervention and other aspects of patient care similar for all patients (or for all patients in a defined subgroup)?* Yes
- *Was the process of observation likely to affect the outcome?* No
- *Did an objective observer assess outcomes and were outcome measurements consistent?* The article does not state that the observers were blinded as regards the outcome assessment. Outcome measures were consistent.
- *Was follow-up duration appropriate?* N/A
- *Was follow-up rate sufficient?* N/A

- **Conclusions regarding validity of methods:** There do not appear to be major methodological flaws. However, case series provide the lowest grade of evidence, and consecutive selection of patients may have introduced selection bias. The sample sizes were also small, which can decrease the power of the study.

Results

- There were 17 normal (21.8%), 23 ocular hypertensive (29.5%), and 38 (48.7%) glaucomatous eyes.

- Compared with normal and ocular hypertensive eyes, those with glaucoma had significantly:
  - greater neural network scores on scanning laser polarimetry: 42.21 vs. 19.2 vs. 18.4 for normal and ocular hypertensive eyes, respectively ($p<0.005$).
  - lower maximum modulation, ellipse modulation, and ellipse average (from scanning laser polarimetry), $p<0.005$.

- Mean retinal nerve fiber layer thickness (measured with optical coherence tomography) was significantly ($p<0.001$) less in glaucomatous eyes (56.9μm) than in ocular hypertensive (83.7μm) and normal (90.9μm) eyes.

- Individual scanning laser polarimetry could not distinguish normal from ocular hypertensive eyes from normal eyes.

- All scanning laser polarimetry parameters were significantly associated with optical coherence tomography-generated RNFL thickness ($p<0.01$). Statistically significant correlations were observed between visual field mean deviation and:

  -neural network number: -.51
  -maximum modulation: .39
  -ellipse modulation: .36
  -optical coherence RNFL thickness: .68

Authors' Conclusions

Optical coherence tomography and scanning laser polarimetry were capable of differentiating glaucomatous from non-glaucomatous populations in this cohort; however, considerable overlap was observed among normal, ocular hypertensive, and glaucomatous eyes. Retinal nerve fiber layer thickness by optical tomography demonstrated good correlation with retardation measurements by scanning laser polarimetry.

Reviewer's Conclusions

This study indicates that scanning laser polarimetry may be useful in distinguishing glaucomatous from non-glaucomatous eyes. However, there was considerable overlap/variability between normal, ocular hypertensive and glaucomatous eyes. The study is also limited by a small sample size.