Optic Nerve and RNFL Imaging For Glaucoma Diagnosis

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Optic nerve and RNFL imaging is not important for glaucoma diagnosis
Intraocular pressure

Optic nerve examination

Visual field

HJ

- 73 y.o African American female
- IOP 22 OD 23 OS
- CCT 498 OD 508 OS
• 31 year old Burmese male

• IOP  25 OU

• CCT  548 OD    545 OS
LB

- 51 y.o African American male
- C/o smudge below center of vision in OS
- Paternal aunt and uncle have glaucoma

- IOP  21 OD  24 OS
- CCT  487 OD  476 OS
RM

• 32 y.o Caucasian female

• Past ocular history
  – s/p LPI OU in 1998

• Family history
  – Both parents have glaucoma
  – Father lost vision in one eye from glaucoma

RM - 2002

• IOP
  40 OD
  35 OS

• CCT
  617 OD
  602 OS
• 56 year old Caucasian male

• -7.50 +1.25 x 004

• -7.75 +0.50 x 044

• IOP 25 OD 24 OS

• CCT 580 OD 598 OS
Limitations of OCT

- High refractive error
- Unusual disc size
- Media opacity
- Segmentation errors

46 normal eyes and 46 eyes with early to moderate glaucoma

Three imaging devices
- Stratus OCT, HRT 3, GDxVCC

Qualitative assessment of stereodisc photographs by glaucoma specialists
Imaging versus ONH assessment

- 2 other studies with similar results
  - Subjective assessment of optic nerve head stereophotographs by experienced observers performed better than OCT/HRT/GDx

DeLeon-Ortega et al, IOVS 2006;47:3374-80
Glaucoma diagnosis

• The gold standard is a trained clinician who combines several pieces of clinical information
• No single test can replace the clinician’s assessment
• In equivocal cases, prospective follow-up is sometimes the only way to determine the correct diagnosis

An experienced clinician does not require quantitative imaging of the ONH or RNFL to diagnose glaucoma.
"The Gold Standard for diagnosing glaucoma is a well-trained clinician applying observational skills in the examination of the optic nerve, and interpreting examination findings in the clinical context of a particular patient. Computerized imaging technology cannot substitute for sound clinical skills and judgment in the diagnosis of glaucoma."

"Structural changes in the optic nerve head may precede visual field abnormalities in early glaucoma. These changes may be subtle and manifest themselves over many years. Therefore, careful documentation of optic nerve structure at the time glaucoma is initially suspected will be extremely valuable in subsequently confirming or excluding a diagnosis of glaucoma during a patient's lifetime."

"No instrument utilizing computerized imaging technology currently exists that has a sensitivity and specificity required to function as a useful screening tool for glaucoma."

"Documentation of optic nerve structure is of limited use in advanced glaucoma. The diagnosis of advanced glaucomatous optic neuropathy is easily made by the trained observer, and does not require confirmation by optic nerve imaging studies. Also, small changes in optic nerve topography are difficult to measure in the presence of advanced neuroretinal rim loss. Functional assess

Reference

• While OCT provides an objective measurement of nerve fiber layer structure, its clinical use in the early detection and follow-up of glaucoma patients requires additional clinical evaluation. This author does not currently use this information to make important therapeutic decisions in patients at present. Additional clinical correlation with existing techniques and prospective evaluations are required."

Reference
Jaffe, G. J., and Caprioli, J., Perspective: Optical Coherence Tomography to Detect and Manage Retinal Disease and Glaucoma, AJO, January 2004.
There are two challenges to assessing the structure of the optic nerve. The first is distinguishing between a normal and a glaucomatous optic nerve at a single point in time at any severity of disease. This is obviously more difficult in mild disease. However, the Gold Standard of performing this task is the well-trained clinician. The ability of current imaging technology to allow the clinician to diagnose glaucoma correctly on a single examination is not perfect, and its usefulness in this regard is of secondary importance. The more important challenge is detecting glaucoma progression over time. Scanning laser imaging of the optic nerve enhances, but does not replace good clinical skills in diagnosing glaucoma. On a cautionary note, it is unsound clinical practice to base treatment decisions on a single-imaging study, and we must interpret imaging data in a clinical context.

Reference