

Gonioscopy

The diagnosis of POAG requires careful evaluation of the anterior chamber angle to exclude angle-closure glaucoma or secondary causes for IOP elevation, such as angle recession, pigment dispersion, pseudoexfoliation syndrome, peripheral anterior synechiae, angle neovascularization, and inflammatory precipitates.²³⁸ A useful technique to examine a narrow anterior chamber angle is to have the patient look slightly towards the mirror of the gonioscope into which the examiner is looking. The use of a grading system for gonioscopy is desirable. The Spaeth gonioscopy grading system describes with detail the anterior chamber angle anatomy with a high correlation to ultrasound biomicroscopy.²³⁹

(See www.gonioscopy.org for discussion of the techniques of gonioscopy.)

Optic nerve head and retinal nerve fiber layer clinical examination

Examination of the ONH and RNFL provides valuable structural information about glaucomatous optic nerve damage and thinning of the RNFL.^{4, 240-243} Physical features that may indicate glaucomatous optic neuropathy include the following:

- ◆ Vertical elongation of the optic nerve cup with an associated decrease in neuroretinal rim width
- ◆ Enlargement of the optic nerve cup
- ◆ Diffuse or focal narrowing of the neuroretinal rim, especially superior and/or inferior
- ◆ Optic disc hemorrhages involving the disc rim, parapapillary RNFL, or lamina cribrosa
- ◆ Nasalization of central ONH vessels
- ◆ Baring of the circumlinear vessel
- ◆ Absence of pallor in the neuroretinal rim
- ◆ Diffuse or focal thinning of the RNFL
- ◆ Beta-zone parapapillary atrophy

The size of the physiologic cup is related to the size of the optic disc. Larger overall disc area is associated with a larger optic nerve cup. Commonly, the neuroretinal rim of the optic nerve is widest inferiorly and narrowest temporally. This anatomic feature is referred to as ISNT: the neuroretinal rim is widest at the inferior rim, followed by the superior rim, followed by the nasal rim, and lastly by the temporal rim.²⁴⁴⁻²⁴⁶ In approximately 80% of glaucoma patients, cupping does not follow this rule because both the inferior and superior rims show thinning.^{244, 245} However, a recent study has demonstrated that normal eyes follow the ISNT rule less than 45% of the time.²⁴⁶

Visible structural alterations of the ONH or RNFL and development of parapapillary choroidal atrophy in early glaucoma may precede the onset of visual field defects.^{241, 247-249} Other investigations have reported functional deficits occurring in advance of structural change.^{250, 251} Careful examination of the optic disc neural rim for small hemorrhages is important because these hemorrhages sometimes herald focal disc damage and visual field loss, and they may signify ongoing optic nerve damage in patients with glaucoma.^{54, 70-72, 80, 84, 152, 252-258} In the Ocular Hypertension Treatment Study (OHTS), the incidence of POAG in eyes with disc hemorrhage was 13.6% compared with 5.2% in eyes without disc hemorrhage over 8 years.⁵⁴ In the EGMT, 13% of patients had disc hemorrhages at baseline examination, and hemorrhages were associated with progression.⁷²

The optic nerve should be carefully examined for the above signs of glaucomatous damage, and its appearance should be documented.^{4, 242, 259} The preferred technique for ONH evaluation involves magnified stereoscopic visualization (as obtained with the slit-lamp biomicroscope), preferably through a dilated pupil. In some cases, direct ophthalmoscopy complements magnified stereoscopic visualization, providing additional information of optic nerve detail as a result of the greater magnification of the direct ophthalmoscope. Red-free illumination of the posterior pole may aid in evaluating the RNFL.²⁶⁰ Color stereophotography is an accepted method for documenting qualitative ONH appearance. Computer-based image analysis of the ONH and RNFL/macula is a complementary method for documenting the optic nerve and is discussed in the Diagnostic Testing section below. Computer-based imaging and stereoscopic photography of the optic nerve provide