The Spaeth Gonioscopic Grading System

Assessing the configuration of the anterior chamber angle.

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An evaluation of the anterior chamber angle's configuration is an essential part of the anterior segment examination, especially in patients with glaucoma. Characterizing the individual anatomy of the anterior chamber angle and distinguishing normal from pathologic configurations is best performed with gonioscopy during the initial evaluation of glaucoma suspects. Moreover, periodic gonioscopy is appropriate for patients with suspected angle closure or shallow anterior chambers, those on miotic therapy, or phakic individuals with lenticular changes.[1] This article describes how to use the Spaeth Gonioscopic Grading System (SGGS) to record the anatomy and pathology of the anterior chamber angle.

TABLE 1. VAN HERICK SYSTEM*

Grade 4	Angle is wide open	PAC > CT
Grade 3	Angle is narrow	PAC = 1/4 - 1/2 CT
Grade 2	Angle is dangerously narrow	PAC = 1/4 CT
Grade 1	Angle is dangerously narrow or closed	PAC < CT

** Compares peripheral anterior chamber (PAC) depth to corneal thickness (CT).*

BACKGROUND

One may screen the depth of the anterior chamber angle without gonioscopy by shining a penlight from the temporal side of the eye across the anterior segment. The examiner observes the beam of light as it shines through the anterior segment onto the patient's nose. In the case of a shallow anterior chamber, one would expect a shadow to be cast from the iris onto the nasal side due to significant bowing of the iris. Although simple, this method is rather crude and provides little information or sensitivity.

In an alternative developed by Van Herick et al[2] (Table 1), a narrowed slit beam at a 60º angle shines across the most peripheral part of the cornea, and the examiner compares the anterior chamber depth to the peripheral corneal thickness. Although this method can be a quick, reproducible part of a routine slit-lamp examination, it merely estimates the peripheral depth of the anterior chamber and does not recognize valuable details of the anterior chamber angle's anatomy or configuration. Both methods were useful prior to the advent of indirect gonioscopy using a four-mirror gonioscopy lens or Goldmann contact lenses at the slit lamp.

Since the first use of indirect gonioscopy, a number of grading systems have been created to record and compare the anatomy and pathology of the anterior chamber angle. In 1957, Scheie[3] proposed a grading system in which Roman numerals describe the degree of angle closure based upon the examiner's visualization of the anterior chamber angle's structures; the degree of angle pigmentation was also recorded (Table 2). In 1960, Shaffer[4] devised a grading system that estimates the angle width of the peripheral iris insertion (ie, the point of insertion of the iris to the internal lining of the eye) at the trabecular meshwork (Table 3). In 1972, Becker[5] proposed combining the examiner's estimation of the anterior chamber angle's width with the height of the iris insertion.

THE SGGS

In 1971, Spaeth[6] proposed a new gonioscopic grading system that relies on three separate descriptors of the anterior chamber angle's anatomy, including the iris insertion, angular approach of the iris, and peripheral iris contour (Table 4).

TABLE 2. SCHEIE CLASSIFICATION*

Wide open:	All structures visible
Grade I:	Iris root visible
Grade II:	Ciliary body obscured
Grade III:	Posterior trabeculum obscured
Grade IV:	Only Schwalbe's line visible

** Angle depth system based on structures visualized.*

TABLE 3. SHAFFER SYSTEM*

Grade 4	45° to 35° angle	Wide open
Grade 3	35° to 20° angle	Wide open
Grade 2	20° angle	Narrow
Grade 1	≤ 10° angle	Extremely narrow
Slit	0° angle	Narrowed to slit

** Based on the angular width of the angle recess.*

The Iris Insertion

The most posterior angle structure visible on gonioscopy determines the iris insertion. In the SGGS, the individual iris insertion is designated by a capital letter: *A* describes iris insertion anterior to Schwalbe's line; *B* describes iris insertion between Schwalbe's line and the scleral spur; *C* indicates that the scleral spur is visible; *D* means the iris insertion is deep with the ciliary body visible; and *E* means the iris insertion is extremely deep with more than 1 mm of ciliary body visible.

The Angular Approach

The clinician assesses the angular approach of the peripheral iris to the recess of the anterior chamber angle by means of two tangential lines. One line is tangential to the inner surface of the trabecular meshwork, and the other line is tangential to the middle third of the anterior iris surface. The angle formed by these two lines defines the angular approach and is denoted from 0° to 50°, or greater for a very broad angular approach. It is important to realize that this angle does not identify the angle of the iris recess itself, but rather the angular approach of the iris to this recess.

The Peripheral Iris

The peripheral iris' configuration is described by a lowercase letter. In the original version of the SGGS, *r* signified regular, or smooth, without significant forward or backward arching, *q* meant queer with posterior bowing or a concave appearance, and *s* translated as steep, or sharp, with a convex curve where the iris arises from its root at the ciliary body.

TABLE 4. SPAETH GONIOSCOPIC GRADING SYSTEM*

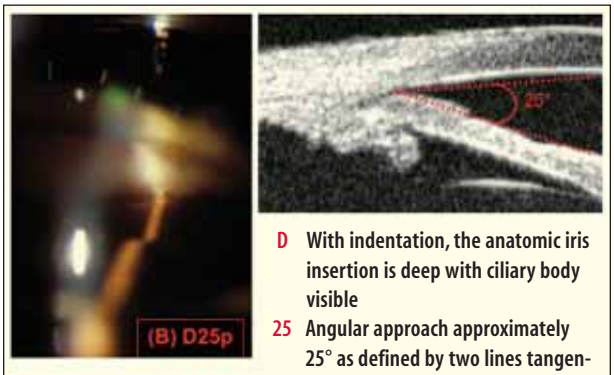
Iris Insertion	Angular Approach	Peripheral Iris		Pigmentation of Trabecular Meshwork
A Anterior to Schwalbe's line	0° to 50°	**r** regular	**f** flat	**0** no pigment
B Between Schwalbe's line and scleral spur		**s** steep	**b** bowed anteriorly	**1+** minimal
C Scleral spur visible			**p** plateau iris	**2+** mild
D Deep with ciliary body visible		**q** queer	**c** concave	**3+** moderate
E Extremely deep with >1 mm of ciliary body visible				**4+** intense

** Evaluating iris insertion, angular approach, peripheral iris configuration, and degree of trabecular meshwork pigmentation.*

In a recent modification of this grading system, further differentiation of the peripheral iris insertion was included by replacing the peripheral iris designators *r*, *q*, and *s* with *f*, *c*, *b*, and *p*. These letters signify, respectively, *flat*, *concave* with posterior bowing, *bowing* anteriorly, and *plateau* configuration. One advantage of the new designators is that, previously, *steep* may not have adequately distinguished between the anterior bowing of the iris with pupillary block or plateau iris configuration. Distinguishing between these peripheral iris configurations has therapeutic implications. For example, primary angle closure due to pupillary block would be alleviated by a peripheral iridectomy, whereas angle closure that is secondary to a plateau iris configuration likely requires a peripheral iridoplasty.

Thus, in the SGGS, the individual anterior chamber angle configuration is designated with a code consisting of at least one capital letter, one number, and one lowercase letter. For example, an anterior chamber angle with the iris insertion posterior to the scleral spur, with a normal angular approach and regular (or flat) peripheral iris configuration, would be described as *D40r* (or *D40f* in the new SGGS).

In addition to the three main factors of angular configuration, the clinician may comment on features such as the pigmentation of the trabecular meshwork (ie, amount and color, pigment puddling, regularity or irregularity of pigment deposition), the presence of peripheral anterior synechiae, and the details of iris processes. Such features of the anterior chamber angle are commented upon separately from the designator.



(B) Optical iris insertion between Schwalbe's line and scleral spur (not shown)

D With indentation, the anatomic iris insertion is deep with ciliary body visible

25 Angular approach approximately 25° as defined by two lines tangential to trabecular meshwork and middle third of the iris surface

p Plateau iris configuration of peripheral iris

Figure 1. According to the SGGS, this plateau iris configuration has a (B)D25p angle. Note its appearance in the gonioscopic view with indentation (left) and the ultrasound biomicroscopic view (top right).

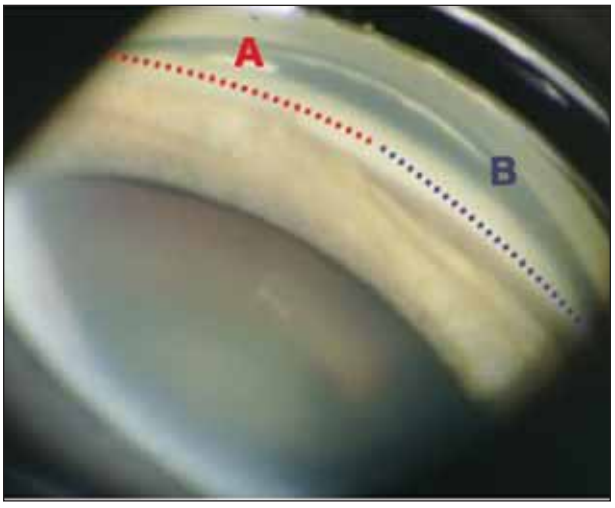


Figure 2. Indentation gonioscopy allows the surgeon to differentiate the "optical" from the actual, anatomic iris insertion. Here, the peripheral anterior synechiae (A) are distinguished from the anatomic iris insertion (B).

Benefit

One advantage of indirect gonioscopy using a four-mirror gonioscopy lens is that dynamic indentation is possible. Clinicians can use the contact lens for purposeful distortion and deepening of the peripheral iris, actions that allow them to distinguish the actual (or anatomic) from the optical iris insertion. This capability is particularly important in eyes in which a narrow angular approach obscures the angular recess and one cannot distinguish if this is due to peripheral anterior synechiae, or the inability to view the angle structures adequately. In the SGGS, the capital letter designating the optical iris insertion prior to indentation is placed in parentheses. The letter designating the actual iris insertion assessed with indentation is recorded without the parentheses. For example, an anterior chamber angle with the anatomic iris insertion at the scleral spur, a narrow angular approach, and a plateau iris configuration would be designated at *(B)D25p* following indentation gonioscopy (Figure 1). Indentation gonioscopy is particularly helpful in identifying and distinguishing a narrow angular approach from peripheral anterior synechiae (Figure 2).

SUMMARY

The SGGS is a reproducible grading system for gonioscopy and describes the anterior chamber angle's anatomy with a high correlation to ultrasound biomicroscopic measurement of the anterior chamber angle's configuration.[7] The method's strength is that it describes at least three major denominators of the anteri-

or chamber angle configuration. Furthermore, this grading system includes a description of the true (rather than apparent) iris insertion, which the examiner determines by indentation gonioscopy. We believe this grading method is an invaluable tool for examining the anterior chamber angle, and we recommend its regular use for recording and following this important anatomic region of the eye. ❑

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