190_11_R3

ORIGINAL ARTICLE

The anterior chamber angle width in adults in a tertiary eye hospital in Nigeria

SNN Nwosu, Akunne I Apakama

Department of Ophthalmology, Nnamdi Azikiwe University, Nnewi Campus, Nigeria

Abstract

Objective: The objective was to determine the anterior chamber angle width in adult Nigerian patients seen at the Guinness Eye Center Onitsha Nigeria.

Materials and Methods: Consecutive new adult patients (aged ≥21 years) seen between March and July 2006 were the subjects of this study. Exclusion criteria included refusal to consent to the test, previous intraocular surgery that could distort the angle integrity and anterior segment pathology precluding the visualization of the angle. Each patient had visual acuity assessment, visual field analysis, ophthalmoscopy, intraocular pressure measurement, refraction, and gonioscopy. The angle grading was by the Shaffer method.

Results: Of the 328 patients (648 eyes), aged 21–85 years (median age 59 years), 195 (59.5%) were females and patients older than 50 years constituted 64.9%. Gonioscopy showed that 245 eyes (37.8%) had wide open angles (grades III and IV); 227 (35.0%) had grade II angles; 176 (27.2%) had narrow angles (grade I or slit), 9 of which were deemed occludable. Of the 80 patients with chronic simple glaucoma, 20 (25%) had at least grade III angle; 34 (42.5%) had grade II angle; and 26 (32.5%) had grade I angle. Peripheral anterior synechiae were observed in three eyes. Compared with nonglaucomatous eyes, the angles of the glaucomatous eyes were significantly narrower (P <0.01). Similarly patients older than 50 years were more likely to have narrower angles (P < 0.001). However there was no significant difference between the angle width of male compared to female patients (P >0.05).

Conclusions: A little more than a third of adult patients seen in our hospital have wide open angles; a third of the glaucoma patients usually taken as open angle cases actually have very narrow angles some of which are occludable. A population-based study is therefore recommended to clearly define the epidemiologic characteristics of glaucoma including the anterior chamber width in different parts of Nigeria.

Key words: Anterior chamber angle, gonioscopy, Nigeria

Date of Acceptance: 25-Mar-2011

Introduction

The anterior chamber angle (between the cornea and the iris) is used to classify glaucoma into the open angle and the angle closure glaucoma. The different types of glaucoma could lead to blindness but their treatment approach is basically different.[1] Gonioscopy is the technique of examining the angle of the anterior chamber with a view to determining its width and other abnormalities such as adhesion between the cornea and the iris (peripheral anterior synechiae).[1]

Glaucoma is the second most common cause of blindness in Nigeria.[2-4] Primary open angle glaucoma is taken as the most common type of the disease while angle closure glaucoma is regarded as being extremely rare in Nigerians.[2,3] This assumption rather than being based on gonioscopic findings, relies heavily on the absence in Nigerian glaucoma patients of the dramatic symptoms and signs that characterize acute angle closure disease. However hospital-based studies in Ibadan have shown that 13-15% of glaucoma patients have narrow angles.[5-7] In a population-

Address for correspondence:
Prof. Sebastian NN Nwosu,
Guinness Eye Center, PMB 1534 Onitsha Nigeria.
E-mail: nwoseb@hotmail.com

Access this article online	
Quick Response Code:	Website: www.njcponline.com
	DOI: ***
	PMID:

based study in Kaduna, Yang *et al*,[8] reported narrow angles and peripheral anterior synechiae in 14.1% of the right eyes of the persons examined in the onchocercal meso-endemic area and 9.3% in the right eyes of persons examined in the onchocercal nonendemic area.

This report is report on the anterior chamber angle width of adult Nigerian patients seen at the Guinness Eye Center Onitsha, Nigeria. The hospital is the only government-owned eye hospital in Anambra State. Although other private eye clinics and eye units of general hospitals exist, it has the largest concentration of ophthalmic facilities and manpower and serves as a major referral center for an immediate population of over 25 million.

Materials and Methods

Consecutive new adult patients (aged ≥21 years) seen at the consultant outpatient clinics of the Guinness Eye Center Onitsha between March and July 2006 were the subjects of this study. Criteria for exclusion from the study included refusal to consent to the test, previous intraocular surgery that could distort the angle integrity, and anterior segment pathology precluding the visualization of the angle.

After obtaining consent, each patient had comprehensive ocular examination including visual acuity, visual field, ophthalmoscopy, slit lamp biomicroscopy with 78D lens, intraocular pressure, and refraction. With the patient's eye in the straight ahead position and without corneal indentation, gonioscopy was performed for each eye with the Haag Streit slit-lamp biomicroscope using the Goldmann 3-mirror lens with methylcellulose as the coupling fluid. One consultant ophthalmologist performed the gonioscopy. The entire circumference of the angle was examined for each eye, noting the width and any other abnormality that may be present.

The angle grading was by the Shaffer method,[1] namely

Grade IV: angle between the iris and the surface of the trabecular meshwork is 45°.

Grade III: angle between the iris and the surface of the trabecular meshwork is greater than 20° but less than 45°.

Grade II: angle between the iris and the surface of the trabecular meshwork is 20°. Angle closure is possible.

Grade I: angle between the iris and the surface of the trabecular meshwork is 10°. Angle closure is probable in time.

Slit: angle between the iris and the surface of the trabecular meshwork is less than 10°. Angle closure is very likely.

Grade 0: The iris is against the trabecular meshwork. Angle closure is present.

For each eye, when a particular width is seen in more than 180° of the angle circumference it is taken as the angle width. An angle is deemed occludable if the posterior trabecular meshwork is not visible for ≥270° of the angle circumference.

The data obtained were analyzed using the chi-square test with the alpha level at 0.05.

Results

A total of 328 patients, aged 21--85 years (median age 59 years), and made up of 133 males (40.5%) and 195 females (59.5%) were studied. Patients older than 50 years constituted 64.9% [Figure 1]. The clinical diagnosis in the 328 patients is as follows: ametropia/presbyopia, 100 (30.5%); allergic/irritative conjunctivitis, 83 (25.3%); chronic simple glaucoma, 80 (24.4%); cataract, 55 (16.8%); central retinal vein occlusion, 5 (1.5%); age-related macular degeneration, 4 (1.2%); uveitis, 1 (0.3%).

Eighty patients (159 eyes) were diagnosed as having chronic simple glaucoma based on intraocular pressure greater than 21 mmHg and optic neuropathy with cup-to-disk ratio of

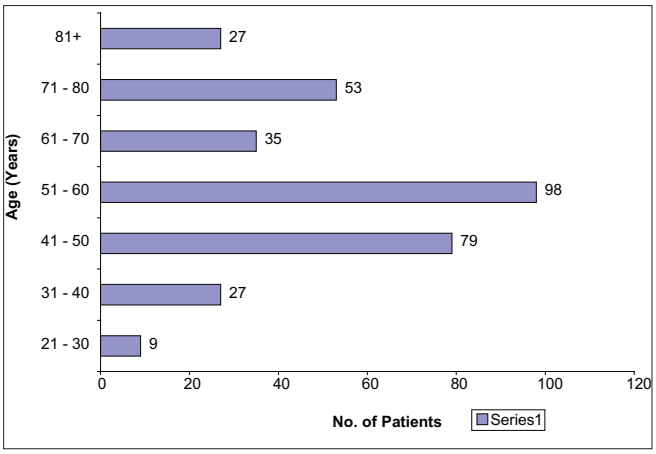

Figure 1: Age distribution

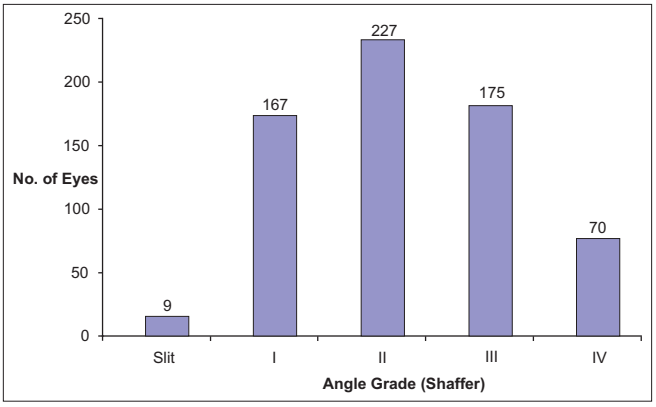

Figure 2: Angle width distribution

0.7 or more and or central visual field defect. One male patient presented with symptoms and signs of acute angle closure. None of the glaucoma patients had secondary glaucoma. Although ametropia including presbyopia was primary diagnosis in 100 (30.5%) patients, refractive errors were actually detected (through retinoscopy) in 180 (54.9%) patients. Of the 180 patients, 117 (65.0%) had hypermetropia and 63 (35.0%) had myopia. The degree of refractive error varied from 0.50 to 6.00 dioptres with the error in 130 (72.2%) patients being less than or equal to 1.00 diopter.

Gonioscopy was performed in 648 eyes of the 328 patients enrolled in the study. In eight patients only one eye had gonioscopy because the contra-lateral eyes had the following problems: leukoma (4 eyes); phthisis bulbi (2 eyes); and eviscerated globes (2 eyes). Figure 2 shows the distribution of the angle width. No eye had a completely closed angle although we suspected that the patient with acute angle closure may have had closed angle in the affected eye. Corneal edema and intense pains could not allow for immediate gonioscopy in the patient. However when gonioscopy was performed after symptoms have subsided and cornea was clearer (following emergency medical treatment) the angles in each eye was Shaffer grade I and deemed occludable.

Of the 648 eyes examined, 245 (37.8%) had wide open angles (grades III and IV); 227(35.0%) had grade II angle; 176 (27.2%) had grade I or slit, 9 of which were deemed occludable. Of the 80 patients with glaucoma, 20 (25%) had at least grade III angle; 34 (42.5%) had grade II angle; and 26 (32.5%) had grade I angle. Peripheral anterior synechiae were observed in 3 eyes. Compared with nonglaucomatous eyes, the angles of the glaucomatous eyes were significantly narrower ($\chi^2 = 14.3$; df – 1; $P < 0.01$). Similarly, as shown in Table 1 , patients older than 50 years were more likely to have narrow angles (i.e., ≤ Shaffer grade II) ($\chi^2 = 43.3$; df – 1; $P < 0.001$). However there was no significant difference between the angle width of male compared to female patients ($\chi^2 = 1.51$; df – 1; $P > 0.05$).

Discussion

The results of this study suggest that (a) only a little above a third (37.8%) of adult patients seen in our hospital have wide open angles while more than a quarter (27.2%) have very narrow angles; (b) only 25% of the patients being treated as open angle glaucoma indeed have wide open angles while a third of the glaucoma patients usually taken as open angle cases actually have very narrow angles some of which are occludable.

Recent studies and recommendations by Foster *et al*,[9] redefined the criteria for diagnosing angle closure glaucoma separating it from primary angle closure. Optic neuropathy is now known not to be a feature restricted to open angle glaucoma. It is also an attribute of angle closure glaucoma. The presence of sudden onset of severe pains, vomiting, ocular congestion, shallow anterior chamber, raised IOP, corneal edema, and mid-dilated pupil only indicate acute angle closure if there is no optic neuropathy.

This study is not focused on investigating glaucoma. Although we found that 27.2% of the patients had narrow angles, some of which were occludable, only one of the glaucoma patients presented with symptoms of acute angle closure. This suggests that chronic angle closure glaucoma which runs a chronic, persistent, and quiet course may be common in Nigerians. This is similar to the experience in different parts of Nigeria. Olurin[5] reported that 13% of eye clinic patients in Ibadan had closed angles although they did not present with the symptoms of acute angle closure. In a later study in the same hospital, Ashaye[6] found that 15% of glaucoma patients compared to 1.6% of nonglaucoma patients had closed angles.

Studies from different parts of the world had reported that narrow angles were commoner in females. Clemenson[10] while reporting a 13% prevalence of occludable angle in Greenland also noted a higher prevalence (19%) among females. Ashaye[6] had observed that two-thirds of her patients with closed angles were females. This differs from the findings of the present study in which there was no

Table 1: Age versus Angle Width*

Age group (Years)	Angle width (Shaffer grading)					
	Slit	I	II	III	IV	Total
21 – 30	-	-	-	3	6	9
31 – 40	-	4	8	8	7	27
41 – 50	-	5	27	40	8	80
51 – 60	-	40	33	15	9	97
61 – 70	2	6	10	12	5	35
71 – 80	5	17	22	7	2	53
>80	2	7	15	3	-	27
Total	9	79	115	88	35	328

*Patients aged >50 years have significantly narrower angles (≤ Shaffer grade II) ($\chi^2 = 43.3$; df – 1; $P<0.001$)

gender predilection for narrow angles. However, it must be cautioned that this is a short hospital-based study with its attendant selection bias.

The tendency for the angle to get narrower with increasing age is similar to the observation of Lowe *et al*.[11] The lens grows throughout life and with enlarging size it pushes the iris forward thus narrowing the angle.[12] Similarly angle closure glaucoma occurs more frequently in older persons peaking among whites in the 55-70 years age range.[13] When it occurs in younger people, angle closure is usually associated with abnormalities in the relative or absolute sizes or positions of the anterior segment structures.[13] Narrow angles were significantly more common in older patients in the present study and 64.5% of our patients were older than 50 years. However, Ashaye[7] in a study of glaucoma patients in Ibadan observed that patients with angle closure glaucoma presented at a younger age than those with open angle glaucoma. While all of Ashaye's patients already had glaucoma, the present study evaluated the anterior chamber angle of both glaucoma and nonglaucoma patients.

The type of refractive errors in our patients may have also predisposed to narrow angles. Hypermetropia is associated with smaller eye balls and relatively narrow angles. Up to 65% of our patients were hypermetropic although most of them were within 1 diopter. None of our patients had nanophthalmos – a condition in which the axial length of the eye is very short and also associated with very high degree of hypermetropia.[13]

The findings in this study have the potential for changing the approach for managing glaucoma patients in Nigeria. The high incidence of narrow angles with the near absence of the classic symptoms and signs of acute angle closure glaucoma suggests that most of our patients may be having chronic angle glaucoma closure. Angle closure and glaucoma ensuing from it require different treatment approach from open angle glaucoma. Goniscopy is the key to differentiating the different types of glaucoma.[1]

Following from the findings in this study it is concluded that more than a third of the adult patients seen in our hospital have narrow angles. Secondly up to a third of glaucoma patients being treated as cases of open angle glaucoma indeed have narrow angles some of which are deemed occludable. While gonioscopy is already accepted as important in the work up of glaucoma patients, it is also hereby recommended that it be routinely performed in all ophthalmic patients above 50 years of age. The limitation of this study, being hospital based, is acknowledged. A community-based study is therefore required to clearly define the epidemiologic characteristics of glaucoma including the anterior chamber width in different parts of Nigeria.

References

1. American Academy of Ophthalmology. Basic and Clinicaal Science Course. Section 10: Glaucoma. San Francisco: American Academy of Ophthalmology; 2009. p. 1-83.
2. Olurin O. Causes of blindness in Nigeria--a study of 1000 hospital patients. West Afr Med J Niger Med Dent Pract 1973;22:97-107.
3. Ayanru JO. Blindness in the Midwestern State of Nigeria. Trop Geogr Med 1974;26:325-32
4. Nwosu SNN. Blindness and visual impairment in Anambra State, Nigeria. Trop Geogr Med 1994;46:346-9.
5. Olurin O. Primary glaucoma in Nigeria. East Afr Med J 1972;49:725-34.
6. Ashaye AO. The anterior chamber angles in Nigerians. Afr J Med Med Sci 2003;32:315-20.
7. Ashaye AO. Clinical features of primary glaucoma in Ibadan. Niger J Ophthalmol 2003;11:70-5.
8. Yang YF, Cousens S, Murdoch IE, Babalola OE, Abiose A, Jones B. Intraocular pressure and gonioscopic findings in rural communities mesoendemic and nonendemic for onchoceriasis, Kaduna State, Nigeria. Eye (Lond) 2001; 15:756-9.
9. Foster PJ, Buhrmann R, Quigley HA, Johnson GJ. The definition and classification of glaucoma in prevalence surveys. Br J Ophthalmol 2002;86:238-42.
10. Clemmesen V, Alsbirk PH. Primary angle-closure glaucoma (a. c. g) in Greenland. Acta Ophthalmol (Copenh) 1971;49:47-58.
11. Lowe RF, Clark BA. Radius of curvature of the anterior lens surface. Correlations in normal eyes and in eyes involved with primary angle-closure glaucoma. Br J Ophthalmol 1973;57:471-4.
12. Lowe RF. Primary angle closure glaucoma: a review of ocular biometry. Aust J Ophthalmol 1977;5:9-17.
13. Ritch R, Chang BM, Liebmann JM. Angle closure in younger patients. Ophthalmology 2003;110:1880-9.

How to cite this article: ???

Source of Support: Nil, **Conflict of Interest:** None declared.