ORIGINAL ARTICLE

Is angle closure glaucoma a problem in Nigeria?

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Abstract

Purpose: The aim of this study was to report the characteristics of angle closure glaucoma (ACG) in eye clinic patients of University College Hospital (UCH), Ibadan, Nigeria.

Materials and Methods: A total of 336 consecutive new glaucoma patients of all age groups who presented to the glaucoma clinic of UCH over a 1 year period between December 2009 and November 2010 were evaluated. Each patient had a complete ophthalmic evaluation, including relevant history, visual acuity testing, slit-lamp examination, applanation tonometry, gonioscopy with a Posner lens and standard automated perimetry. Patients with previous incisional surgery and corneal opacities precluding gonioscopy were excluded.

Results: Of the 336 patients, 60 eyes of 31 patients (9.2%) had angle closure with or without glaucoma. The mean age was 59.0 ± 15.4 years and there was a female predilection (58.1%). Forty eight eyes (80%) had primary angle closure glaucoma, eight eyes (13.4%) had primary angle closure, two eyes (3.3%) had plateau iris syndrome and two eyes (3.3%) had secondary ACG (post uveitis). Also, 45.2% of the patients presented with at least one blind eye (<3/60). The mean intraocular pressure (IOP) at presentation was 28.7 ± 12.7 mmHg. A total of 54.8% presented with advanced glaucoma (mean deviation >12 dB). Twelve eyes underwent laser iridotomy or surgical iridotomy and others had trabeculectomy or antiglaucoma medications. Mean IOP post intervention was 17.4 ± 6.9 mmHg.

Conclusion: ACG is not an uncommon disease. Early and effective diagnosis is important to prevent blindness.

Key words: Angle closure, glaucoma, Nigeria

Date of Acceptance: 21-May-2013

Introduction

Glaucoma is the most common cause of irreversible blindness world-wide[1,2] and in Nigeria.[3] The prevalence of glaucoma is highest in West Africa[4] and in people of African descent.[5] Blindness from chronic glaucoma in the United States has been reported to be 4-6 times more common in black than in white populations.[6] Although most glaucoma in Africa is primary open angle glaucoma (POAG), angle closure glaucoma (ACG) does occur in Sub-Saharan Africa.[7,8]

Population-based studies in South and East Africa have reported the prevalence of primary angle closure glaucoma (PACG) to be 0.1-2.3%.[7-9] Herndon *et al*.[10] conducted a hospital based survey of the glaucomas in Ghana and reported that the prevalence of chronic angle closure glaucoma (CACG) was 6.6%. In that study, it was noted that all the patients with PACG were being followed up in other hospitals as POAG and receiving chronic medical treatment. Many studies[4,11-14] have reported the prevalence of glaucoma blindness in several African countries; however, many of these studies did not perform gonioscopy, thus a determination of the types of glaucoma was not reported.

A clinic-based study conducted in South Africa reported that the rate of primary angle-closure (PAC) (by gonioscopy with verified closure of the angle and raised intraocular pressure [IOP]) was equal among the black

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Access this article online

Quick Response Code:

Website: www.njcponline.com

DOI: 10.4103/1119-3077.127425

PMID: 24553024

and white populations of Johannesburg, although it was less symptomatic in blacks than whites.[15] The morbidity of CACG has been reported to be higher than POAG, with more patients with CACG progressing more rapidly to blindness.[16] It is however notable that CACG is treatable with laser or surgical therapy if detected in a timely manner.

It is possible that angle closure may be underdiagnosed in Nigeria in large part because gonioscopy is underutilized as a diagnostic tool. This study was conducted to investigate the prevalence and characteristics of angle closure at a glaucoma clinic in a tertiary hospital in Nigeria.

Materials and Methods

A total of 336 consecutive new patients of all age groups who presented to the glaucoma clinic of the University College Hospital, Ibadan, Nigeria, over a 1-year period between December 2009 and November 2010 were evaluated. This study adhered to the tenets of the Declaration of Helsinki.

Each patient had their complete history which included symptoms suggestive of angle closure and family history of glaucoma and ophthalmic evaluation, consisting of uncorrected and best corrected distance and near visual acuity (VA), slit lamp examination, IOP by Goldmann applanation tonometry and gonioscopy using a 4-mirror Posner lens. All patients were examined by either of the two ophthalmologists. Gonioscopy was performed in a dark room with a 1 mm height slit lamp beam. The patient was instructed to look straight. One drop of tetracaine was placed on the gonioscopy lens, which was then gently placed on the cornea. The slit beam was positioned in the superior, temporal, inferior and nasal mirrors and care was taken to ensure that the slit beam didn't encroach upon the pupillary area. Indentation gonioscopy was performed to differentiate synechial closure from appositional closure. Patients with previous incisional surgery and corneal opacities precluding gonioscopy were excluded.

Automated full-threshold visual fields was performed for subjects with best-corrected VA better than 6/60 using the 24-2 SITA standard program on the Humphrey 740 Visual Field Analyzer (Carl Zeiss, Inc., Dublin, California, USA). Patients with angle closure were dilated after laser or surgical peripheral iridotomy was performed. Stereoscopic examination of the vitreous, retina and optic nerve head was performed with the 78-diopter lens. Using a structured questionnaire, we obtained the following information, age, gender, type of glaucoma, pre-operative IOP, VA, presence of glaukomflecken, cup to disc ratio (CDR) and mean deviations (MDs) on Humphrey automated perimetry. Laser iridotomy was performed with neodymium-doped yttrium aluminum garnet (Nd: YAG) laser (Zeiss Inc.). Energy levels varied between 7.0 mJ and 9.0 mJ.

Diagnostic criteria

An occludable angle was defined as one in which not more than 180° of the circumference of the pigmented trabecular meshwork was visible. Persons in whom primary angle closure (PAC) was suspected had an occludable angle and no other abnormality (normal IOP, normal optic nerve heads and no abnormality on visual fields). PAC was diagnosed in persons with a normal visual field and optic disc but having an occludable angle and evidence of angle dysfunction. Dysfunctional features included elevated IOP (≥20 mmg), peripheral anterior synechiae and glaucomflecken. When glaucomatous optic neuropathy was present with definite visual field defect consistent with glaucoma in the presence of an occludable drainage angle, a diagnosis of PACG was made. A diagnosis of plateau iris was made based on the double hump sign. The diagnosis of glaucoma was based on the International Society of Geographical and Epidemiologic Ophthalmology classification.[14]

Statistical analysis was performed using the SPSS version 16 (SPSS, Inc, Chicago, USA). Frequencies and means were generated to observe patterns of variable distribution among the patients.

Results

A total of 336 new glaucoma patients were evaluated over a 1-year period. Mean age was 56.5 ± 16.5, with 56.3% males. The male:female ratio was 1.3:1. Sixty eyes of 31 patients (9.2%) had angle closure with or without glaucoma. The mean age of these patients was 59.0 ± 15.4 years, with a median age of 61 years (range 13-88 years). There was a female predilection, 18 (58.1%). A total of 48 eyes (80%) had PACG, eight eyes (13.4%) had primary angle closure, two eyes (3.3%) had plateau iris syndrome and two eyes (3.3%) had secondary ACG (post uveitis). Of the 48 eyes with PACG, 36 eyes (75%) had synechial ACG while 12 eyes (25%) had appositional ACG [Table 1]. During this period, a total of 24 patients (48 eyes) had PACG, accounting for 7.1% of all the glaucoma patients that presented to the eye clinic.

Of the 31 patients (60 eyes) with angle closure with or without glaucoma, 14 patients (45.2%) presented with

Table 1: Frequency of angle closure with and without glaucoma

Diagnosis	Number of eyes	%
PACG (synechial)	36	60.0
PACG (appositional)	12	20.0
PAC	8	13.4
PI configuration	2	3.3
Secondary ACG	2	3.3
Total	60	100.0

PACG=Primary angle closure glaucoma; PAC=Primary angle closure; PI=Plateau iris configuration; ACG=Angle closure glaucoma

at least one blind eye (<3/60) and 9 (29%) of them were bilaterally blind. The mean IOP at presentation in the right eye was 28.7 ± 12.7 mmHg and in the left eye, it was 29.1 ± 11.75 mmHg. The baseline MD on Humphrey visual field was − 12.3 ± 9.7 dB with 17 patients (54.8%) presenting with advanced glaucomatous optic neuropathy (CDR 0.9-1.0) and severe visual field loss (MD > 12 dB) in at least one eye. Table 2 shows the demographic and clinical characteristics of the patients.

A total of 6 patients (12 eyes) underwent laser iridotomy or surgical iridectomy with or without anti-glaucoma medications, which included prostaglandin analogues, pilocarpine, topical or systemic osmotic diuretics and B-blockers such as timolol or betaxolol. Six patients declined any form of surgical intervention and were commenced on medications, which included 4% pilocarpine 4 times daily. Nine eyes had laser iridotomy while three eyes had surgical iridotomy because of thick irides which could not be penetrated with the YAG laser despite several attempts. Patients with end stage disease in one eye (blind) and advanced disease in the other eye with bilateral synechial angle closure, had trabeculectomy as the first intervention instead of laser. Ten patients had trabeculectomy while nine patients didn't have any intervention because they were bilaterally blind at presentation. Mean IOP post intervention at 1 year was 17.4 ± 6.9 mmHg.

Discussion

ACG is more common among certain racial groups. The highest rates have been reported in Inuits,[17,18] Chinese and other Asian populations.[19,20] Lower and almost equal rates have been reported among Caucasians and Africans. The incidence of ACG in Far East Asians is approximately 1%, which accounts for more than 50% of all cases of glaucoma in this population.[21]

Table 2: Demographic and clinical characteristics of patients

Demographic and clinical characteristics	*N*=60 eyes (%)
Gender	
Male	13 (41.9)
Female	18 (58.1)
Mean age and SD	59.0±15.4
Visual acuity	
≥6/18	26 (43.3)
6/18-6/60	10 (16.7)
<6/60	24 (40.0)
Mean IOP±SD (RE)	28.7±12.7
Mean IOP deviation (RE)	10.39
Mean IOP±SD (LE)	29.1±11.7
Mean IOP deviation (LE)	9.80
CDR (mean±SD) (RE)	0.84±0.2
Mean CDR deviation (RE)	0.17
CDR (mean±SD) (LE)	0.83±0.2
Mean CDR deviation (LE)	0.19

CDR=Cup to disc ratio; IOP=Intraocular pressure; SD=Standard deviation; RE=Right eye; LE=Left eye

Studies in Nigeria have reported that ACG is very rare among clinic patients.[22-24] In Ghana, Herndon *et al*.[10] found a PACG prevalence of 6.6% among all the glaucoma patients seen. This is similar to the prevalence of PACG in our study, which was 7.1%. However, when other forms of angle closure are considered, the prevalence was higher. In this study, angle closure with or without glaucoma accounted for 9.2% of all the patients who presented to the glaucoma clinic. We did not have any case of acute ACG or patients with symptoms suggestive of this.

In a study conducted in Temba, North West Province, South Africa, Rotchford *et al*.[8] didn't find acute angle closure among their patients. Other studies[25,26] have also reported that acute ACG is rare among blacks. However, subacute and chronic forms of angle closure are more common among Africans and people of African descent, but it is often a missed diagnosis.[25,26] It has been suggested that African blacks may have a weaker response to mydriatics, which may indicate that their darker irides are less able to exert the mydriatic force needed to lead to acute pupillary block.[27]

Sixty percent of our patients had synechial closure at presentation. This is similar to the report of Buhrmann *et al*.[7] who reported that the majority of patients with PACG had developed synechial angle closure by the time they visited the hospital. Most often these patients develop synechial angle closure without any acute episodes. Creeping angle closure has also been reported to be common among Africans.[28] Oh *et al*.[28] postulated that the anterior insertion of the thick and rigid irides in Africans could predispose to gradual or creeping angle closure which may eventually lead to synechial angle closure. This was also reported among black myopes who had deep anterior chambers.[28]

In this study we were able to diagnose a few patients with primary angle closure. This may have been made possible by the frequent community eye outreach programs in the hospital, which may have enhanced earlier diagnosis of glaucoma in some patients.

Prevalence surveys suggest that glaucoma blindness is more common in cases of ACG and secondary ACG than in COAG.[7,19] Estimates of glaucoma blindness in at least one eye range from 10% to 50% in Inuit and Chinese patients.[29,30] In our study, we found bilateral blindness in 29% of our patients. This is similar to the report in Tanzania by Buhrmann *et al*.[7] who found a glaucoma blindness of 21%. Two patients in our study who had secondary glaucoma were blind in the affected eyes at presentation. Among the Chinese,[29] blindness in one eye among patients with secondary ACG was as high as 71%.

In Ghana, Herndon *et al.*[10] reported that 46.2% of their patients had VA worse than 6/60. This is similar to our results where 40% of our patients had VA worse than 6/60. This further demonstrates the morbidity associated with ACG.

There were more females than males in our study. Several studies have shown that there are more females with angle closure because of their shallower anterior chamber depth.[18,31] Studies have also shown that the depth and volume of the anterior chamber diminishes with age and this may result from thickening and forward displacement of the lens.[32,33] Therefore, the percentage of individuals with critically narrow angles is higher in older age groups. Our study shows that the mean age of the patients with angle closure was higher than the mean ages of all the glaucoma patients. This is similar to findings by Herndon *et al.*[10] who also reported a higher mean age among their CACG patients.

ACG may be prevented or at least delayed by laser iridotomy in individuals with occludable angle, if diagnosed early. The cost of preventing ACG is far less than the chronic management of POAG.[34] We know that the risk of blindness is higher in ACG compared to POAG, therefore, the benefit is greater for each case of ACG prevented or at least delayed.

Our study shows that most of our patients presented with synechial PACG with advanced visual loss. Most of ACG is still underdiagnosed in Nigeria, Sub-Saharan Africa. We recommend that subspecialization training in glaucoma should be encouraged in Nigeria.

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How to cite this article: Olawoye OO, Sarimiye TS. Is angle closure glaucoma a problem in Nigeria?. Niger J Clin Pract 2014;17:159-62.

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