

Clinical profile of the stages of primary angle closure disease in a tertiary eye hospital in South India

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Abstract: Purpose: To study the clinical profile of the three stages of Primary Angle Closure Disease (PACD): Primary Angle Closure Suspect (PACS), Primary Angle Closure (PAC), and Primary Angle Closure Glaucoma (PACG).

Methods: Between October 2011 and May 2013, all consecutive patients of primary angle closure disease (PACD) were enrolled at Glaucoma outpatient department (OPD) in SDEH after subjecting the referred patients to comprehensive eye examination. A record of age and sex distributions, symptomatology, the best corrected visual acuity, intraocular pressure, gonioscopy, disc evaluation and visual fields, and status of the second eye was maintained, with respect to the three stages of angle closure disease: PACS, PAC and PACG.

Result: One hundred eyes of fifty patients with a diagnosis of primary angle closure disease were enrolled at Glaucoma outpatient department (OPD) in SDEH after subjecting the patients to comprehensive eye examination by a single glaucoma specialist. The mean age of the patients included in our study was 56.74 years \pm 7.3 years. 37 patients (74%) presented with complaints of diminution of vision as main symptom, followed by periocular pain, redness, coloured haloes and other complaints. PACS, PAC and PACG were found in 18 (18%), 12 (12%) and 69 eyes (69%) respectively. Mild, moderate, severe visual impairment and blindness was found in 5 (7.2%), 32 (46.4%), 11 (15.9%), 21 (31%) cases respectively.

Conclusion: Primary angle closure glaucoma (PACG) constituted 69% of all adult glaucomas seen. 18% of these had primary angle closure suspect (PACS), 12% had primary angle closure (PAC). Angle closure glaucoma occurred maximally in the sixth decade and females constituted 72% of those affected. 19 patients had bilateral PACG. 16 patients were unilaterally blind with visual acuity less than $<3/60$. As, Primary angle closure disease is an important public health burden, there is a need to improve the detection rates in high risk groups, by doing complete and comprehensive eye examination. Because visual loss resulting from PACG is potentially preventable if peripheral iridotomy or iridectomy is performed in the early stage, strategies for early detection of PACD could reduce the high risk of blindness resulting from PACG.

Keywords: Primary angle closure Glaucoma, stages, symptoms, signs .

1. Introduction

Angle closure glaucoma is one of the causes of irreversible blindness¹⁸⁻²⁰. It is a "sneak thief" of sight due to almost asymptomatic course until very advanced stage of the disease.

Angle closure disease is a protean disease with a differing incidence, indeterminate initial stages, and a varied presentation in different races. There is a significantly high incidence of angle closure glaucoma (ACG) in India, which forms almost half of all adult primary glaucomas seen^{3,4}. There is however a paucity of literature available about the presentations and relative incidence and natural history of the stages of angle closure disease²⁰.

The global prevalence of glaucoma for population aged 40-80 years is 3.54% (95% CI, 2.09-5.82). The prevalence of POAG is highest in Africa (4.20%; 95% CI, 2.08-7.35), and the prevalence of PACG is highest in Asia (1.09%; 95% CI, 0.43-2.32). In 2013, the number of people (aged 40-80 years) with glaucoma worldwide was estimated to be 64.3 million, increasing to 76.0 million in 2020 and 111.8 million in 2040²⁶. Among the oriental population and in the South East Asian countries like India angle closure glaucoma seems to be more prevalent. According to the Andhra Pradesh Eye Disease study⁸ (APEDS), the prevalence of manifest PACG in those above

40 years of age is 1.08%, while the prevalence of occludable angles without angle closure glaucoma is 2.2%.

The Vellore Eye Study¹⁹ estimated the prevalence of PACG to be 4.3% which was about five times more prevalent than POAG in their study. They have also noted that contrary to the traditional teaching angle closure in the study population was not associated with pain. Primary angle closure is potentially reversible by the laser iridotomy^{27, 28} which is a safe and non-invasive procedure.

A prospective study of 50 consecutive patients of primary angle closure disease (PACD), routinely referred to the Glaucoma Services of our hospital, was undertaken to study the clinical profile of the three stages of Primary Angle Closure Disease: Primary Angle Closure Suspect (PACS), Primary Angle Closure (PAC), Primary Angle Closure Glaucoma (PACG).

2. MATERIALS AND METHODS

Study area

All patients attending Glaucoma services outpatient department of a tertiary eye care centre namely Sarojini Devi Eye Hospital located in Hyderabad, Andhra Pradesh, South India, during

October 2011 and May 2013, who were diagnosed to have primary angle closure disease (PACD), were included in the study (Figure 1).

Sample size: Fifty patients.

Study design: A prospective observational study

Exclusion criteria: We excluded patients in whom staging of angle closure disease was not possible, for example, those with aphakia, pseudophakia or previous filtering surgery.

Study protocol: All patients suspected or diagnosed to have glaucoma in the general outpatient department of our hospital are sent for management to the Glaucoma Service. The referrals are based on an individual's symptoms, clinical examination for anterior chamber depth and optic nerve head status, intraocular pressure (IOP) recordings, a visual field. Some cases of acute angle closure glaucoma were initially examined and treated by the ophthalmologist on emergency duty and were then referred to the Glaucoma Service together with their records. Of the cases referred, 50 consecutive patients diagnosed to have a definitive primary angle closure disease were prospectively studied with respect to the three stages of angle closure disease: PACS, PAC, and PACG.

All patients were evaluated by a single Glaucoma specialist. Detailed eye examination was performed which included detailed history about age, sex, annual income, educational and occupational status, symptoms at the time of presentation and visual acuity assessment using Snellen's visual acuity chart, refraction, best corrected visual acuity (BCVA), torch light examination (including flashlight test, and swinging flashlight test to detect RAPD), slit lamp examination of anterior segment including van Herick's test, iris and pupillary sphincter changes, pseudo exfoliation, neovascularisation iris, intraocular pressure measurement (IOP) with Goldmann applanation tonometer (GAT), angle evaluation with indentation gonioscopy using a Sussmann four mirror lens. The examination of posterior segment was done using stereo biomicroscopy with non contact lens, +78D or +90 D lens and indirect ophthalmoscopy using +20 D lens. The size of the optic disc, the status of neuro retinal rim, vertical and horizontal cup disc ratio and presence of any other glaucomatous features like notching, splinter haemorrhages and peripapillary atrophy were documented. Data on each subject was recorded in data collection forms.

3. Definitions

All patients diagnosed with primary angle closure were classified using International Society of Geographical and Epidemiological Ophthalmology Classification (ISGEO).

Classification of primary angle closure based on natural history:

Primary angle closure suspect (PACS): An eye in which appositional contact between the peripheral iris and posterior trabecular meshwork (PTM) is present or considered possible, in the absence of elevated IOP, peripheral anterior synechiae, disc or visual field (VF) changes. Epidemiologically, this has been defined as an angle in which $\geq 270^\circ$ of PTM cannot be seen gonioscopically. But, for practical purposes, 180° was used.

Primary angle closure (PAC): An eye with an occludable drainage angle and features indicating that trabecular obstruction by the peripheral iris has occurred, such as peripheral anterior synechiae, elevated IOP, iris whorling, "glaucomaflecken" lens opacities or excessive pigment deposition on the trabecular surface. The optic disc does not have glaucomatous damage.

Primary angle closure glaucoma (PACG): PAC together with evidence of glaucoma is glaucomatous optic neuropathy and corresponding VF loss.

Socio economic status grades were classified according to modified Kuppuswamy scale.

The data thus collected was subjected to analysis.

4. Results

One hundred eyes of fifty patients with a diagnosis of primary angle closure disease were included in the study. The mean age of the patients included in our study was 56.74 years \pm 7.3 years (range 42-75 years). There were 36 (72%) females and 14 (28%) males in the study.

Demographic profile including the age, sex, rural or urban status, socioeconomic status is shown in Table 1 and Fig 1. 27 (54%) patients were in the range of sixth decade PACD occurred between 40-70 years with the maximally affected decade being the sixth. Females were more commonly involved with PACG (62%). 29 (58%) were from urban region and 27 (54%) of patients were from lower socioeconomic status.

Table 1 Demographic profile of the participants

Age group (yrs)	N (%)	Gender	N (%)	Status	N (%)	SES	N (%)
40-50	10 (20%)	Men	14 (28%)	Rural	21 (42%)	Upper	1 (2%)
51-60	27 (54%)	Women	36 (72%)	Urban	29 (58%)	Upper middle	8 (16%)
61-70	12 (24%)	-	-	-	-	Lower middle	14 (28%)
>70	1 (2%)	-	-	-	-	Upper lower	22 (44%)
-	-	-	-	-	-	Lower	5 (10%)

Fig 1: Socioeconomic strata

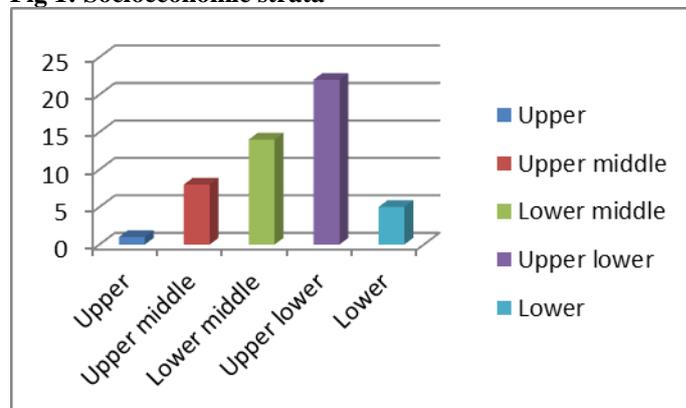


Table 2 shows that 37 patients (74%) presented with complaints of diminution of vision as main symptom, followed by periocular pain, redness, coloured haloes and other complaints. PACS, PAC and PACG were found in 18 (18%), 12 (12%) and 69 eyes (69%) respectively (Fig 3). Out of 69

eyes with PACG, 19 patients had bilateral PACG. 16 patients were unilaterally blind with visual acuity less than <math><3/60</math>.

Table 2. Profile of the presenting complaints of patients with PACD

Presenting complaint	N (%)
Diminution of vision	37 (74%)
Pain and Redness	7(14%)
Blurred Vision and coloured haloes	5(10%)
Other complaints	1(2%)

Table 3 Visual impairment in the patients with PACG

Presenting VA	N (%)
6/6 – 6/18	5 (7.2 %)
<math><6/18 -6/60</math>	32 (46.4%)
<math><6/60 -3/60</math>	11 (15.94%)
<math><3/60</math>	21 (30.4%)

Fig 2 Profile of the presenting complaints of patients with PACD

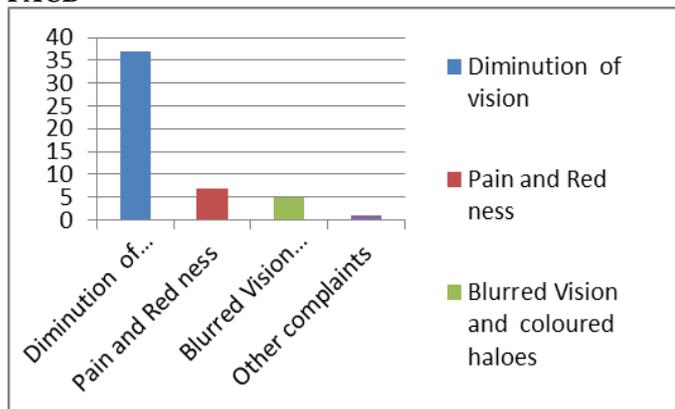


Fig 3 Stages of primary angle closure disease

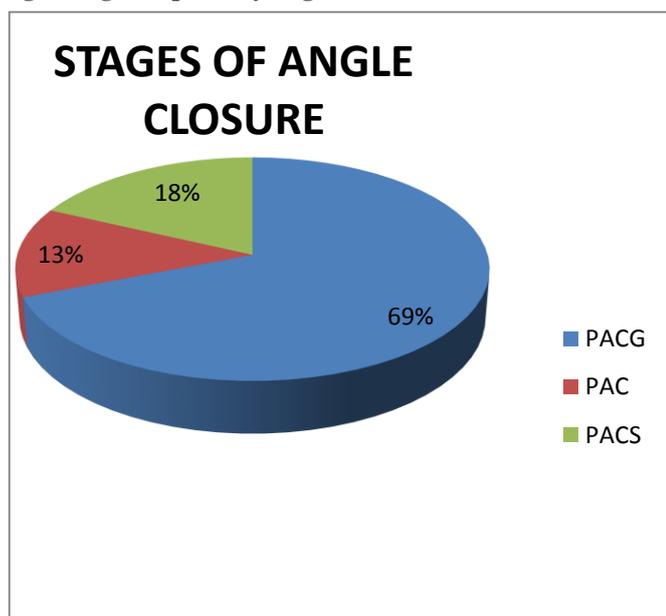
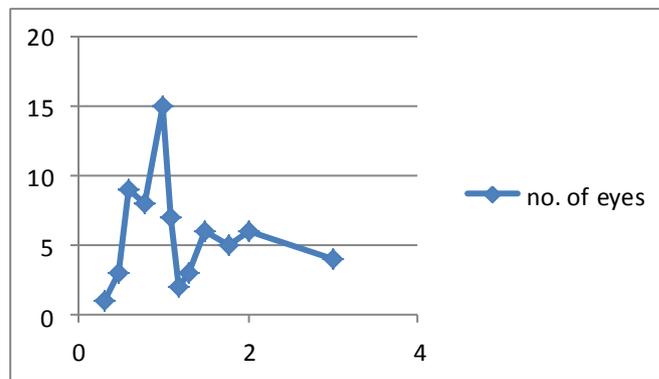


Fig 4 Visual acuity at presentation among PACG patients in logmar units



Mild, moderate, severe visual impairment and blindness was found in 5 (7.2%), 32 (46.4%), 11 (15.9%), 21 (31%) cases respectively. The details of visual impairment in patients with PACG are shown in Table 3. The mean visual acuity (logmar) in PACG patients at presentation was 1.21 ± 0.63 (Fig 4).

5. DISCUSSION

Glaucoma is the leading cause of blindness in the adult population in India¹. WHO currently ranks Glaucoma as the second most common cause of blindness². The Epidemiology of PACD has received marked attention in recent times³⁻²³. Angle closure glaucoma is a potentially treatable condition by laser iridotomy if recognised before the optic neuropathy sets in.

We have classified the three stages of angle closure disease²⁴ seen in a large referral hospital in South India on the basis of age, sex, socioeconomic status, symptomatology and examination. Exclusion of patients having undergone a prior cataract or glaucoma surgery may have altered the data to a certain extent, but was necessary to identify the stages.

Out of 69 eyes with PACG, 19 patients had bilateral PACG which shows the asymptomatic nature of the disease and the patients presented when the vision in other eye was also affected. 16 patients were unilaterally blind with visual acuity less than <math><3/60</math>. Diminution of vision was the main presenting symptom in 37 (54 %) patients, followed by periocular pain which was more common in acute attack. Similar to our study, a study by Parul et al¹⁶ reported that diminution of vision was the most common presenting symptom. Most patients presented late in the course of the disease because of asymptomatic nature of the disease.

In our study, 36 (72 %) patients were females and 14 (28 %) were males, which shows a female preponderance. A study by Vijaya et al¹³ reported that PACG more common in females compared to males.

In our study, 27 (54 %) patients were in the range of sixth decade. A study by Parul et al¹⁶ and Sihota et al¹⁷ reported that PACG is more common in sixth decade in agreement with our study.

In our study, 29 (58%) patients were from urban area and 21 (42%) were from rural area. A study by Vijaya et al¹³ reported mild dominance of PACG in urban area than in rural area.

It is observed in our study, that 54% of patients were from lower socioeconomic status in comparison with a study by Dandona et al⁸ who stated the reasons for more prevalence in lower socioeconomic status was lack of awareness, low educational status and asymptomatic nature of the disease.

The risk factors for PACD were found to be increasing age, female gender, low socioeconomic strata. The diminution of

vision was the main presenting symptom with visual acuity <6/60 in the worst eye in most of the cases, which shows the asymptomatic nature of the disease.

Limitations

One limitation was that our study was a hospital based study with a small sample size.

6. Conclusion

Primary angle closure disease is an important public health burden²². So, there is a need to improve the detection rates in high risk groups, by doing IOP measurement, gonioscopy, and optic disc and visual field evaluation, as a part of complete and comprehensive eye examination.

We have attempted to separate the three stages of PACD into identifiable entities. Primary angle closure glaucoma (PACG) constituted 69% of all adult glaucomas seen. 18% of these had primary angle closure suspect (PACS), 12% had primary angle closure (PAC). Angle closure glaucoma occurred maximally in the sixth decade and females constituted 72% of those affected. 19 patients had bilateral PACG. 16 patients were unilaterally blind with visual acuity less than <3/60. There are considerable differences as well as an overlap of clinical features in the stages of angle closure disease, which suggest some anatomical differences or dissimilar pathogenic mechanisms in these eyes. Because visual loss resulting from PACG is potentially preventable if peripheral iridotomy or iridectomy is performed in the early stage, strategies for early detection of PACD could reduce the high risk of blindness resulting from PACG.

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 - Participated as Principal Investigator for various community relevant surveys
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