

The screening test for angle closure glaucoma in high risk patients

*¹ Dr. Sathyalakshmi, ² Dr. Girish F Hongal

¹ Assistant Professor, Dept. of Ophthalmology, The Oxford Medical College, Bangalore, Karnataka, India

² Associate Professor, Dept. of Ophthalmology, The Oxford Medical College, Bangalore, Karnataka, India

Abstract

Introduction: It is estimated by the year 2010, 60.5 million people would be burdened by glaucoma and that by 2020 there would be 79.6 million sufferers, 47% of the glaucomas worldwide would be in Asia with more than 75% being Angle closure glaucoma.

Methodology: 200 patients who were having high risk for development of angle closure glaucoma were selected by routine history and relevant examination and with their consent subjected them for the provocative tests and results were analysed and discussed.

Results: Among the total 202 patients in the study group there were 120 (59.41%) patients gave positive result in prone test and 82 (40.59%) patients gave negative result in the prone test.

Conclusion: Provocative tests may give added weightage to the decision of subjecting the patient for the prophylactic surgery.

Keywords: screening test, angle closure glaucoma, high risk patients

Introduction

The many clinical entities grouped under angle-closure glaucoma are characterized by iridotrabecular apposition or adhesion or both. In most cases, no problem is detected until the outflow facility has decreased enough to cause a clinically significant elevation of intraocular pressure (IOP). The sequence of events and the mechanism can be highly variable, however. In each case, an initial attempt to identify the anatomical changes and the pathophysiology must be carried out to make the correct and early diagnosis and choose the most appropriate management.

It is estimated by the year 2010, 60.5 million people would be burdened by glaucoma and that by 2020 there would be 79.6 million sufferers, 47% of the glaucomas worldwide would be in Asia with more than 75% being Angle closure glaucoma [1]. Among Caucasians, it is well known that 75 to 95% of primary glaucoma is due to open angle glaucoma, with angle closure comprising only a very small minority of cases. These figures are reversed among other groups such as Asians and Eskimos. Where primary angle closure glaucoma (PACG) makes up 80 to 90% primary glaucoma. Among Asians, the prevalence of PACG is intermediate between Caucasians and Eskimos [2]. Glaucoma is the second cause of the world Blindness after the cataract. Approximately half is thought to be primary angle closure glaucoma (PACG) [3]. At present 12 million Indians were affected by glaucoma accounting for 12.8% of the blindness of the country with 45 to 55 percent of primary glaucoma being PACG [4]. A large proportion of PACG in this population was undiagnosed and untreated because more than 80% of the chronic angle closures have no significant symptoms. Because visual loss resulting from PACG is potentially preventable if peripheral iridotomy or iridectomy is performed in the early stages, strategies for early detection of PACG could reduce the high risk of blindness resulting from PACG seen in this urban population of India [5].

Because acute angle closure glaucoma frequently damages eyes and vision, yet may show no obvious evidence of its presence between attacks and because, in favourable

circumstances it can be cured by relatively simple surgery, appropriate provocative tests appear highly desirable to facilitate its detection before an all too obvious acute attack develops⁶. Hence, to know whether the screening tests can determine the patients at risks of developing ACG, the following study is imminent.

Methodology

200 patients who were having high risk for development of angle closure glaucoma were selected by routine history and relevant examination and with their consent subjected them for the provocative tests and results were analysed and discussed.

Inclusion Criteria

1. Patients more than 40 years of age.
2. First degree relatives of angle closure glaucoma patients.
3. Fellow eye of angle closure glaucoma patient.
4. Hypermetropic patients.

Exclusion Criteria

1. Patients less than 40 years of age.
2. Patients with open angle glaucoma.
3. Myopic patients.

Sampling Size and Methods

Minimum of 200 patients who were having high risk for development of angle closure glaucoma were selected by routine history and relevant examination and with their consent subjected them for the provocative tests and results were analysed and discussed.

All the 200 patient who are at risk of ACG well evaluated taking detail history and examination Detailed history pertaining to the risk factors which may cause future Angle closure glaucoma were ascertained.

The details of history included duration, onset of pain, redness, watering, headache, visual loss and associated symptoms like nausea and vomiting was taken. Any history of previous attack of Angle closure glaucoma was enquired.

Physical Examination of all the 200 patients included a thorough examination of general and systemic examination, examination of globe and adnexa and included all the features which helps in evaluating the associated risk of Angle closure glaucoma.

A detailed perform of the case sheet as been shown later, vision and refraction, fundal examination, angle structure perimetry, A –scan, Intra -ocular pressur. Vision and refraction was done with snellen’s chart & recorded

Fundal examination was done under dilated pupil.Angle structure studied with Goldman three mirror gonioscopy and graded accordingly and Visual field was done with octopus perimeter.Three reading of IOP measurement done with applanation tonometer before and after the provocative tests and average of three readings was taken.

Three provocative tests were done on all patients and conclusion was given the three test as follows.

1. Prone test- Patient was asked to sleep in prone position by keeping his hands on fore head with eyes open, then after 60min I.O.P.measured.if I.O.P. is more than 8mm of hg it was taken as positive test.
2. Mydriatic test- 0.5% of tropicamide was put till the diladation of pupil then after 60-90min the I.O.P. was measured if it was more than 8-10mmof hg, it was taken as positive.
3. Dark room test- patient was made to sit in dark room for 60min with his eyes open to avoid miosis and later I.O.P. was measured. if was more than 8mm of hg then it was taken as positive.

Patients who are recorded positive were advised to under go prophylactic peripheral iridectomy to avoid future angle closure glaucoma.

Results

Table 1: The distribution of test status in the study group

Status	Tests Type					
	PT	(%)	MT	(%)	DT	(%)
Positive	120	59.41	104	51.49	82	40.59
Negative	82	40.59	98	48.51	120	59.41
Total	202(η)		202(η)		202(η)	

Table (1), shows the distribution of tests status in the study group

- Among the total 202 patients in the study group there were 120 (59.41%) patients gave positive result in prone test and 82 (40.59%) patients gave negative result in the prone test.
- Among the total 202 patients in the study group there were 104 (51.49%) patients gave positive mydriatic test and 98 (48.51%) patients gave negative result in the mydriatic test.
- Among the total 202 patients in the study group there were 82 (40.59%) patients gave positive result in the dark room test and 120 (59.41%) patients gave negative result in the dark room test.

Table 2: The distribution of Anterior Segment and Dark Room Test.

Anterior Segment	Dark Room Test.		Total
	Negative	Positive	
Normal	52(25.74)	9(4.46)	61
Shallow	68(33.66)	73(36.14)	141
Total	120	82	202

$\chi^2 \eta -\xi = 24.1965; d.f = 1; \leq 0.001(HS)$
Fisher Exact Test $P \leq 0.0001 (HS)$

Table (2), shows distribution according to anterior segment and dark room test

- In 61 patients having normal anterior segment the dark room test was negative in 52 (25.74%) and positive in 9 (4.46%).
- In 141 patients having shallow anterior chamber the dark room test was negative in 68 (33.66%) and positive in 73 (36.14%).
- In total among 202 patients the dark room test was negative in 120 patients and positive in 82.

Table 3: The distribution of Anterior Segment and Prone Test.

Anterior Segment	Prone Test		Total
	Negative	Positive	
Normal	56(27.72)	5(2.48)	61
Shallow	26(12.87)	115(56.93)	141
Total	82	120	202

$\chi^2 \eta -\xi = 95.0312; d.f = 1; P \leq 0.0013(HS)$
Fisher Exact Test $P- Value \leq 0.0001(HS)$

Table (3), shows distribution according to Anterior Segment & Prone Test.

- In 61 patients with normal anterior segment the prone test was negative in 56 (27.72%) and positive in 5 (2.48%).
- In 141 patients with shallow anterior segment the prone test was negative in 26 (12.87%) and positive in 115 (56.93%).
- Among 202 patients 82 showed negative prone test and 120 showed positive prone test.
- As the P value is highly significant (HS), which indicates the prone test results in comparison with anterior segment is highly significant.

Table 4: Distribution of Anterior Segment and Mydriatic Test.

Anterior Segment	Mydriatic Test		Total
	Negative	Positive	
Normal	51(25.25)	10(4.95)	61
Shallow	47(23.27)	94(46.53)	141
Total	98	104	202

$\chi^2 \eta -\xi = 43.083; d.f = 1; P \leq 0.001(HS)$
Fisher Exact Test $P \leq 0.0001(HS)$

Table (4), shows distribution of Anterior Segment & Mydriatic Test

- In 61 patients with normal anterior segment the mydriatic test was negative in 51 (25.25%) and positive in 10 (4.95%).
- In 141 patient with shallow anterior chamber the mydriatic test was negative in 47 (23.26%) and positive in 94 (46.53%)
- Among 202 patients the mydriatic test was negative in 98 patients and positive in 104 patients.

Table 5: Distribution of Scheie’s Angle Grade and Dark Room Test

Angle Grades	Dark Room Test		Total
	Negative	Positive	
1	23(11.39)	5(2.48)	28
2	31(15.35)	12(5.94)	43
3	34(16.83)	25(12.38)	59
4	32(15.84)	40(19.80)	72
Total	120	82	202

$\chi^2 = 15.633$; d.f = 3; P-Value = 0.0013(HS)

- Among 28 patients having grade 1 angle, the dark room test was negative in 23 (11.39%) and positive in 5 (2.48%).
- Among 43 patients having grade 2 angle, the dark room test was negative in 31 (15.35%) and positive in 12 (5.94%).
- Among 59 patients having grade 3 angle, the dark room test was negative in 34 (16.83 %) and positive in 25 (12.38%).
- Among 72 patients having grade 4 angle, the dark room test was negative in 32 (15.84%) and positive in 40 (19.80%).

Table 6: Distribution according to Scheie’s Angle Grade & Prone Test.

Angle Grades (Scheie’s)	Prone Test		Total
	Negative	Positive	
1	26(12.87)	2(0.99)	28
2	18(8.91)	25(12.38)	43
3	14(6.93)	45(22.28)	59
4	24(11.88)	48(23.76)	72
Total	120	82	202

$\chi^2 = 40.2759$; d.f = 3; P-Value <0.0001(HS)

Table 6 shows distribution according to Scheie’s Angle Grade & Prone Test.

- Among 28 patients with grade 1 angle, the prone test was negative in 26 (12.87%) and positive in 2 (0.99%).
- Among 43 patients with grade 2 angle, the prone test was negative in 18 (8.91%) and positive in 25 (12.38%).
- Among 59 patients with grade 3 angle, the prone test was negative in 14 (6.93%) and positive in 45 (22.28%).
- Among 72 patients with grade 4 angle, the prone test was negative in 24(11.88%) and positive in 48 (23.76%).

Table 7: Distribution of Angle Grade and Mydriatic Test.

Angle Grades (Scheie’s)	Mydriatic Test		Total
	Negative	Positive	
1	26(12.87)	2(0.99)	28
2	26(12.87)	17(8.42)	43
3	18(8.91)	41(20.30)	59
4	28(13.86)	44(21.78)	72
Total	98	104	202

$\chi^2 = 34.8293$; d.f = 3; P-Value <0.0001(HS)

- Among 28 patients with grade 1 angle, the mydriatic test was negative in 26(12.87) and positive in 2(0.99).
- Among 43 patients with grade 2 angle, the mydriatic test was negative in 26(12.87) and positive in 17(8.42).

- Among 59 patients with grade 3 angle, the mydriatic test was negative in 18(8.91) and positive in 41(20.30).
- Among 72 patients with grade 4 angle, the mydriatic test was negative in 28(13.86) and positive in 44(21.78).

Discussion

Photogrammetric studies of all forms of angle-closure glaucoma have revealed anterior chamber depths, volumes, and diameters that are smaller than matched controls. Anterior chamber depth and volume have also been shown to have diurnal variation, with lower values in the evening, although a correlation between diurnal variations of chamber depth and IOP is not clear. In any case, the most important step in the diagnosis of either potential or manifest angle-closure glaucoma is to evaluate the anterior chamber depth and especially the configuration of the anterior chamber angle [7, 8, 9].

In the present study 141 (69.80%) patients had shallow anterior chamber and 61 (30.20%) had normal chamber.

Among 61 patients having normal anterior segment the dark room test was negative in 52 (25.74%) and positive in 9 (4.46%).

Among 141 patients having shallow anterior chamber the dark room test was negative in 68 (33.66%) and positive in 73 (36.14%).

Among 61 patients with normal anterior segment the prone test was negative in 56 (27.72%) and positive in 5 (2.48%).

Among 141 patients with shallow anterior segment the prone test was negative in 26 (12.87%) and positive in 115 (56.93%).

Among 61 patients with normal anterior segment the mydriatic test was negative in 51 (25.25%) and positive in 10 (4.95%).

Among 141 patient with shallow anterior chamber the mydriatic test was negative in 47 (23.27%) and positive in 94 (46.53%) The results were comparable with the previous studies.

Whenever the peripheral anterior chamber depth is felt to be shallow, careful gonioscopic examination of the angle is required. Scheie noted high risk of angle closure in eyes with grade 3 or 4 angles. Shaffer also attempted to correlate the angle grade with the potential for angle-closure [10, 11].

In the present study among 28 patients having grade 1 angle, the dark room test was negative in 23 (11.39%) and positive in 5 (2.48%).

Among 43 patients having grade 2 angle, the dark room test was negative in 31(15.35%) and positive in 12 (5.94%).

Among 59 patients having grade 3 angle, the dark room test was negative in 34 (16.83 %) and positive in 25 (12.38%).

Among 72 patients having grade 4 angle, the dark room test was negative in 32 (15.84%) and positive in 40 (19.80%).

Among 28 patients with grade 1 angle, the prone test was negative in 26 (12.87%) and positive in 2 (0.99%).

Among 43 patients with grade 2 angle, the prone test was negative in 18 (8.91%) and positive in 25 (12.38%).

Among 59 patients with grade 3 angle, the prone test was negative in 14 (6.93%) and positive in 45 (22.28%).

Among 72 patients with grade 4 angle, the prone test was negative in 24 (11.88%) and positive in 48 (23.76%)

Among 28 patients with grade 1 angle, the mydriatic test was negative in 26 (12.87) and positive in 2 (0.99).

Among 43 patients with grade 2 angle, the mydriatic test was negative in 26 (12.87) and positive in 17(8.42).

Among 59 patients with grade 3 angle, the mydriatic test was negative in 18(8.91) and positive in 41(20.30).

Among 72 patients with grade 4 angle, the mydriatic test was negative in 28(13.86) and positive in 44 (21.78)

Hence the results of the present study were comparable with the previous studies.

Conclusion

According to the present study we can conclude that though the provocative tests yield less accurate results, though it is time consuming but along with the proper clinical evaluation including anterior chamber evaluation and grading of the angle, these provocative tests may give added weightage to the decision of subjecting the patient for the prophylactic surgery who are at high risk in our set up.

References

1. Sood D, Sood NN. Angle Closure and India. Indian. J. Ophthalmol. 2006; 54:147-148.
2. Congdon N, Wang F, Tielsch JM. Issues in the epidemiology and population based screening of primary angle closure glaucoma. Surv Ophthalmol. 1992; 36(6):4411-23.
3. Johnson GJ, Foster PJ. Can we Prevent Angle Closure Glaucoma? Eye. 2005; 19(10):1119-24.
4. Thomas R, Paul P, Muliya J. Glaucoma in India. J. Glaucoma. 2003; 12:8187.
5. Dandona L, Dandona R, Mandal P *et al.*, Angle Closure Glaucoma in an Urban population in Southern India. The Andhra Pradesh Eye Disease Study. Ophthalmology. 2000; 107(9):1710-6.
6. Ronald Lowe F. Primary Angle Closure Glaucoma. Br. J. Ophthalmol. 1967; 51:727-32.
7. Shields M. Bruce. Text book of Glaucoma, 4th edn; Pupillary block Glaucomas. Philadelphia: Lipincott Williams & Wilkins. 1999, 177-94.
8. Lee DA, Brubaker RF, Ilstrup DM. Anterior chamber dimensions in patients with narrow angles and angle-closure glaucoma. Arch Ophthalmol. 1984; 102:46.
9. Mapstone R, Clark CV. Diurnal variation in the dimensions of the anterior chamber. Arch Ophthalmol. 1985; 103:1485.
10. Scheie HG. Width and pigmentation of the angle of the anterior chamber: A system of grading by gonioscopy. Arch Ophthalmol. 1957; 58:510.
11. Shaffer RN. Symposium: Primary Glaucomas III. Gonioscopy, ophthalmoscopy and perimetry. Trans Am Acad Ophthalmol Otol. 1960; 62:112.