

## THE PROBLEM OF GLAUCOMA IN SINGAPORE

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Glaucoma is a problem to Ophthalmologists in any country. To those who have been in practice for some time, certain definite conceptions and ideas have arisen from their clinical experiences. It was felt by the author that a study of the material seen in the Ophthalmic Department, at General Hospital would be of some value in either supporting or denying such notions on the subject that may already have arisen in his own mind. It was also felt that the results of such a study could possibly give rise to interesting data and information and stimulate further investigations into the problem.

### MATERIAL AND METHODS

The author has selected material from 1964 to 1966 (inclusive) for the purpose of the study from the cases that were seen in the Glaucoma Clinic of the Ophthalmic Department of General Hospital. This clinic has been in operation since 1959. All Glaucoma cases are divided into 4 categories:

- A. Primary Closed Angle
- B. Primary Open Angle
- C. Congenital
- D. Secondary

The attention of this study is focussed on the Primary glaucomas. It must be noted that it has been the policy of this Department to examine all patients over the age of 40 for glaucoma. Measurement of intra ocular pressure and optic disc examinations are the two investigations recommended for quick screening. Other tests are carried out when deemed necessary.

Table I shows the incidence of Glaucoma in the Ophthalmic Department of the General Hospital, Singapore, in the years 1964, 1965 and 1966. A percentage ranging from 1.13% to 1.55% is seen with a mean of 1.29%. Taking the primary glaucomas, 290 cases of the 346 cases of glaucoma are primary ones and the percentage incidence ranges from 0.93% to 1.3% with a mean of 1.08%. A much lower figure would therefore exist for the whole population, even if allowance (as it should be made) is given to the likelihood that a number of primary open angle glaucomas may not present themselves for examination at the Department and remain "hidden". Primary Open Angle Glaucoma does not produce urgent symptoms drawing the patient's attention to his eye condition.

Table II exhibits some very interesting data. Consistently in each year the number of Primary Closed Angle Glaucomas far exceeds the Primary Open Angle Glaucomas. Out of 346 glaucomas seen, 230 or 66.4% are due to Primary Closed Angle Glaucoma, and 51 or 14.7% are due to Primary Open Angle Glaucoma. Primary Closed Angle Glaucoma is therefore 4.5 times as common as Primary Open Angle Glaucoma. Congenital Glaucoma forms 2.8%. Secondary Glaucomas forms 16.1%, a little more frequently seen than Primary Open Angle Glaucoma. It is acknowledged that Primary Closed Angle Glaucoma always predominate over Primary Open Angle Glaucoma in any clinic's or institutional figures. It must be remembered that a number of Primary Open Angle Glaucomas may remain "hidden" and the proportion between the two glaucomas may not be as high as 4.5 to

TABLE I  
INCIDENCE OF GLAUCOMA IN THE OPHTHALMIC  
OUTPATIENT DEPARTMENT, GENERAL HOSPITAL

Year	Total No. of New Outpatients	Total No. of New Glaucoma Patients	Percentage	No. of Primary Glaucoma	Percentage
1964	9,200	104	1.13	86	0.93
1965	9,200	143	1.55	120	1.3
1966	8,500	99	1.16	84	0.98
Total	26,900	346	1.29	290	1.08

TABLE II  
ANALYSIS OF THE FIGURES FOR GLAUCOMA 1964-1966

Year	Total No. of cases	Primary Closed Angle			Primary Open Angle			Congenital	Secondary
		M	F	Total	M	F	Total		
1964	104	29	42	71	6	7	13	2	18
1965	143	35	58	93	13	12	25	2	23
1966	99	24	42	66	7	6	13	5	15
Total	346 (100%)	88	142	230 (66.4%)	26	25	51 (14.7%)	9 (2.8%)	56 (16.1%)

Note: Primary Closed Angle Glaucoma was 4.5 times as frequent as Primary Open Angle Glaucoma.

1. None the less, I would say, that whatever corrective figures are made, they would never change the fact that Primary Closed Angle Glaucoma is more common than Primary Open Angle Glaucoma in Singapore.

TABLE III

Type of Glaucoma	M	F
Primary Closed Angle	88 (38.26%)	142 (61.74%)
Primary Open Angle	26 (50.98%)	25 (49.02%)

Table III indicates that whereas in Primary Closed Angle Glaucoma the incidence in females is 1.6 times that in males, in Primary Open Angle Glaucoma the incidence is about equal for both sexes.

TABLE IV  
INCIDENCE OF GLAUCOMA:  
RACIAL STUDIES

	Singapore's Population	Primary Closed Angle	Primary Open Angle
Chinese	75%	91.3%	67.5%
Indian	8.2%	5.7%	15.5%
Malay	14.1%	0.9%	15.0%
Others	2.6%	2.0%	2.0%

Table IV provides data on the incidence in relation to the population of Singapore. It will be seen that with Primary Closed Angle Glaucoma the incidence in the Chinese race is very much higher than the other races, and not in proportion with the racial break down of the population of Singapore. It will also be seen that the incidence of this type of Glaucoma in Malays is relatively low.

However, there is some degree of parallelism between the incidence of Primary Open Angle Glaucoma to the racial break down of Singapore's population.

These findings do support our clinical impression in the past. In trying to relate the great preponderance of Primary Closed Angle Glaucoma in the Chinese with their refractive error, interesting information will probably arise. A study of the incidence of refractive error and type of refractive error occurring in our local Chinese population would seem to be most useful.

Then again the Indian race appears to have a greater susceptibility to Primary Open Angle Glaucoma. Arterio-sclerosis and diabetes seem to be more common in the Indian and there may be a linkage here in the pathogenesis and aetiology.

TABLE V  
MEAN AGE

a) Primary Closed Angle	55.29 years
b) Primary Open Angle	51.6 years

Table V shows the mean age of incidence in Primary Closed Angle Glaucoma and Primary Open Angle Glaucoma.

In the causation of blindness, Glaucoma is without a doubt a formidable threat in Singapore.

TABLE VI  
BLIND STATISTICS — CAUSES

Cause	Percentage (nearest)
1. Optic Atrophies	25%
2. Glaucoma	20%
3. Corneal Conditions	19%
4. Inflammation	15%

(Nearly 1,200 Blind registered in Singapore) 1963.

Table VI gives the breakdown in the statistics of the blind in Singapore as far as cases that have been registered are concerned. There are nearly 1,200 blind in Singapore. Whilst no doubt there will be some more who have not come forward for registration or treatment and are thus not known to the register, I do not think there is a significant number. This is because of our well developed social welfare and health systems and the fact that communication and travel is very easy in our small country. About 20% of the blind are due to Glaucoma. Optic Atrophy (other than that caused by glaucoma) is the most frequent cause of blindness in Singapore.

TABLE VII  
PERCENTAGE BLINDNESS DUE  
TO GLAUCOMA

Year	Total Blind	Glaucoma Blind	Percentage
1964	91	20	21.9%
1965	105	26	24.7%
1966	91	24	26.3%

Table VII shows the registration figures for blindness due to Glaucoma in 1964, 1965 and 1966. As can be seen it ranges from 21.9% in 1964 to 26.3% in 1966. As a cause of blindness it ranks second to Optic Atrophy (excluding Glaucoma Optic Atrophy) throughout the years.

TABLE VIII  
GLAUCOMA BLIND — 1964-1966  
(70 CASES)

Type	Number	Sex		Percentage
		M	F	
Primary Closed Angle	Type I	25	-	-
	II	11	-	-
	III	6	-	-
Total	42	17	25	60%
Primary Open Angle	22	13	9	31.4%
Congenital	3	2	1	4.3%
Secondary	3	2	1	4.3%

Note: Primary Closed Angle Glaucoma = 1.9 times Primary Open Angle Glaucoma.

Table VIII indicates in detail a study of the Glaucoma blind in Singapore that were newly registered in 1964-1966. There are 70 cases in all. Primary Closed Angle Glaucoma has 42 cases or 60% of the total. Primary Open Angle Glau-

coma has 22 cases or 31.4% of the total. Congenital and Secondary Glaucomas show 3 cases each with a 4.3% of the total.

Primary Closed Angle Glaucoma therefore is 1.9 times as frequent as Primary Open Angle Glaucoma as a cause of blindness (*i.e.* bilateral blindness). However, morbidity figures have shown (See Table II) that Primary Closed Angle Glaucoma is 4.5 times as frequently seen as Primary Open Angle Glaucoma. To emphasise this, it will be seen that 42 blind from Primary Closed Angle Glaucoma were registered from 1964-1966 and 230 new cases of Primary Closed Angle Glaucoma were seen in the same period. However, 22 blind from Primary Open Angle Glaucoma were registered for the same period and in this time only 51 new cases of Primary Open Angle Glaucoma were seen. This is quite easily explained. It confirms that Primary Open Angle Glaucoma is likely to progress to Blindness more so than Primary Closed Angle Glaucoma. This is because of the very nature of the disease and its progressive and inexorable tendency to Blindness. The other factors which further contribute to this is the quietness of the disease, and its lack of symptoms in its early stages, and for that matter until blindness almost nearly ensues in a majority of cases.

That bilateral blindness should be seen with Primary Closed Angle Glaucoma is most unfortunate because it seldom affects both eyes at the same time and also because the symptoms are almost always distressing and the patient therefore is aware that something is wrong with his eye or eyes. That we do see bilateral blindness is due to the following factors:

i) Neglect of the first eye for a period of time and delay in seeking treatment for the 2nd eye which has a history of typical acute congestive glaucoma.

ii) The very occasional case with bilateral onset, or when the 2nd eye is affected very soon after first and there is associated delay in seeking treatment.

i) and ii) constitute Type I—25 out of the 42 cases of Primary Closed Angle Glaucoma. These are cases with typical acute attacks seen by the attendant physician or described by the patient.

iii) In 11 cases out of the 42 cases of Primary Closed Angle Glaucoma, the signs and symptoms were those of a chronic nature which resulted in either unawareness of the danger or of the disease. (Type II)

- iv) In 6 out of the 42 cases, the patients came up in the stage of bilateral absolute glaucoma with a history of Blindness of several years. (Type III)

Ignorance, fear and prejudice of hospitals and Western medicine is a problem to be overcome in order to eradicate Primary Closed Angle Glaucoma as a cause of blindness.

The policy of the Ophthalmic Department at General Hospital is such that all cases of Primary Closed Angle Glaucoma in one eye are subject to careful scrutiny in their second eye and prophylactic peripheral iridectomy is performed if evidence suggests the possibility of the 2nd eye undergoing subacute or acute attacks of angle closure.

Blindness from secondary glaucoma is seen in 3 cases. One is the result of Diabetes Mellitus with bilateral neovascularization of the angles, another from old bilateral retinal detachments with uveitis and the third from neglected bilateral cataracts.

TABLE IX  
SEX RELATIONSHIP

Type	Male	Female
Primary Closed Angle Glaucoma	40.47%	59.53%
Primary Open Angle Glaucoma	59.1%	40.9%

Table IX shows the sex relationship in blindness due to Glaucoma. In Primary Closed Angle Glaucoma, females again predominate the males whilst there is the reverse in Primary Open Angle Glaucoma.

Table X gives the racial distribution of the Glaucoma Blind. It is noted that there is a close similarity between these figures for both

Primary Closed Angle Glaucoma and Primary Open Angle Glaucoma in the incidence of Glaucoma and in the figures for Blindness from Glaucoma. It confirms that the Primary Closed Angle Glaucoma in causing blindness affects the Chinese population much more so than the other races. This again emphasises the proportionately greater incidence of Primary Closed Angle Glaucoma in the Chinese population of Singapore.

SUMMARY

The incidence of manifest glaucoma amongst the patients attending the Ophthalmic Department of General Hospital for the three years, 1964-1966 was investigated. The incidence of blindness due to Glaucoma for the same years was also studied. The results show that:

- i) The incidence of Primary Glaucoma is 1.08% amongst the Outpatients attending the Department.
- ii) Primary Closed Angle Glaucoma is 4.5 times as common as Primary Open Angle Glaucoma.
- iii) In Primary Closed Angle Glaucoma, the incidence in females is 1.6 times that in males and that in Primary Open Angle Glaucoma the incidence in males and females is equal.
- iv) The incidence of blindness due to Glaucoma ranges from 21-26% for the years 1964-1966.
- v) Glaucoma remains the second most important and frequent cause of blindness in Singapore.
- vi) Primary Open Angle Glaucoma is a relatively more frequent cause of blindness than Primary Closed Angle Glaucoma.

TABLE X  
RACIAL DISTRIBUTION OF GLAUCOMA BLIND

Type	Total No.	Chinese percentage	Indian percentage	Malay percentage
Primary Closed Angle	42	40 (95.2%)	2 (4.8%)	0 (0%)
Primary Open Angle	22	14 (63.6%)	5 (22.7%)	3 (13.7%)

- vii) There is a greater incidence of Primary Closed Angle Glaucoma in the Chinese than in other races. This is seen in both the studies on the morbidity of Glaucoma and Blindness due to Glaucoma.

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